MODEL AIRPLANE NEWS

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THE WORLD'S PREMIER R/C MODELING MAGAZINE

48120

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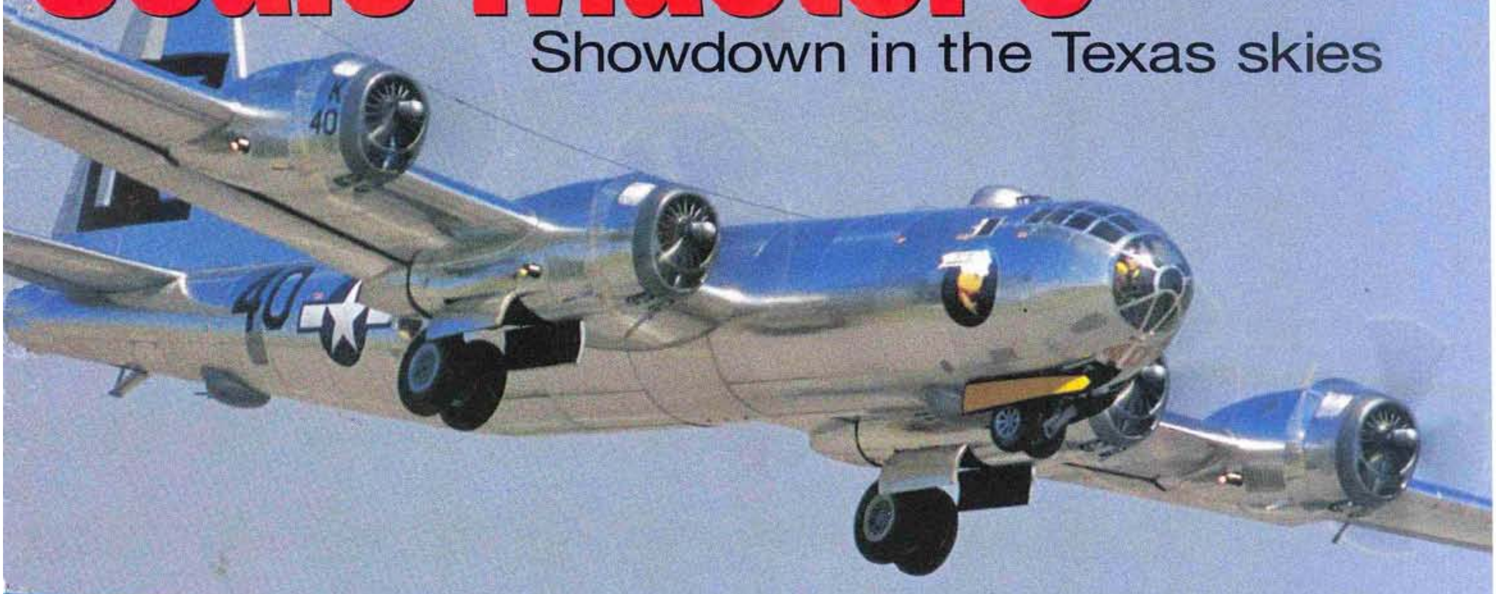
Scale Masters

Showdown in the Texas skies



Aerobatic Aces & their High-Powered Machines

TOURNAMENT OF CHAMPIONS

May 1998

USA $4.95 CANADA $5.95

REVIEWS: Lanier **RC PRO-CUB**
Linck Models **CHIPS AKRO II**
Great Planes **ULTIMATE 40**

MODEL AIRPLANE NEWS

ON THE COVER: *Mike Barbee's B-29 does a flyby at the Masters (photo by Jerry Nelson). Insets left to right: Bill McCallie's P-51 about to settle in after a successful sortie. • Corvin Miller's Swift; a gorgeous example of the detailing that goes into Scale Masters' aircraft. • Wayne Frederick's D-VIII catches some Texas sun.*

ON THIS PAGE *(top to bottom): Linck Models Chips Akro II; Pat McCurry sets the needle on his Scale Masters entry; Lanier RC Pro-Cub; Quique Somenzini shadow-flies his routine at TOC.*

May 1998 • Volume 126, Number 5

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EDITORIAL

by LARRY MARSHALL

JUST DO IT... BETTER!

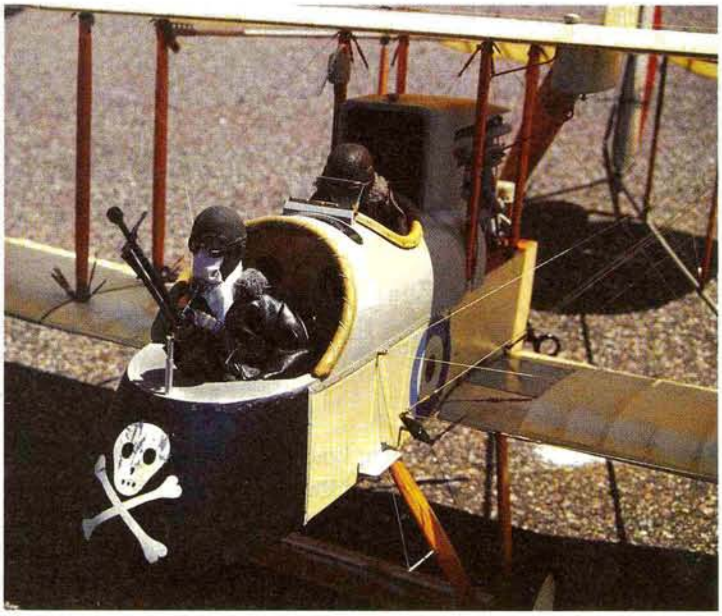
I was talking with one of our readers the other day, and he said, "I can't build scale models; they're just too complicated." This reminded me of some advice that a modeling buddy once gave me. I had commented on the detail on some of his models. He said, "Every painting is complex, but each brush stroke is simple." This was his way of saying that divided into its basic components, even the most complex project will become a bunch of fairly simple tasks.

> *"He did each thing as if he did nothing else."*
> —Charles Dickens

This is very good advice for those who want to improve their models or who are attempting a new form of modeling. I guess—now that I think about it—that this is exactly what our authors do when they divide a how-to article into a series of photos with captions. Kit manufacturers do it by dissecting "Build the wing" into a series of 30 steps.

But there's a second piece of advice that should go along with the divide and conquer approach to building models. As you approach each task, slow down and do that job as well as you know how, and better than you did last time. In my experience, this is a lot easier to recommend than to actually do, but it sure makes for a more convincing model. The reason this advice is hard to follow is that allowing fewer compromises will, without a doubt, increase the time required to finish the model. This reality is hard to swallow as, for instance, creating a rivet is easy. Creating 10,000 of them, each with the "gotta do it right" approach, requires considerable character strength and time. But in the end, if you've created 9,990 rivets perfectly and botched the other 10, somehow, those 10 will stand out from the crowd. In approaching such tasks, you should also take solace in the knowledge that if you screw it up, you can always redo it, given enough patience.

How do you develop this patience? For me, it's most important to eliminate those things that result in a "need" to finish the project. The things that cause a project to be rushed will be different for each person, of course, but I think the one thing most R/C modelers have in common is the need to get the plane in the air. For instance, how many of you have done a less than perfect job of using your favorite plastic covering because you "... want to fly it this weekend?" Have you ever taken shortcuts to get a model ready for an event? I have, especially when working at 3 a.m. the night before the event. The results, in all cases, have been less than optimal, and they took the "edge" off the pride I had in taking the model to the flying field.



John Cole's DH-1 is a good example of a complex project requiring a divide and conquer approach.

The solution, of course, is to avoid such artificial deadlines in your building. The simple realization that the finishing of a model should take you as long as the building will produce better results. Maybe the most powerful tool to confront rushing is to always think that the model you're building will be better than the last one. This sort of personal competition, if applied consistently, will help you improve both your skills and your patience. Give it a try.

LEARNING FROM THE MASTERS

Another thing you can do to improve your modeling is to try to mimic what the masters do and let them motivate you to build better models. And one place to find these guys is at the U.S. Scale Masters. If you get to know some of the guys who take part in events like the Masters and Top Gun, you'll find they're just like you and me. They use putty to fill gaps and dents, know well the need to redo a job that didn't work the first time and probably get frustrated in the shop at times. If these guys differ from us at all, it's in their patience and experience. Use these great modelers and their creations as motivators. You don't need to detail your models to the extent that they do, but attempt to execute your models in the crisp and precise manner they use.

To get you started in that venture, Jerry Nelson brings you some of that motivation with his coverage of the Scale Masters. He aimed his camera at some of the best scale models on the planet. We think you'll really enjoy what he captured with his camera and his words. The '97 Scale Masters was held in Irvine, TX; if you can, plan to attend the 1998 Scale Masters in Ohio.

Air SCOOP

by CHRIS CHIANELLI

New products or people behind the scenes; my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

G&P Sales F7F

Because Bill Price of G&P Sales is a true modeler like the rest of us, I thought you guys might like a preliminary look at his latest undertaking: a soon to be available, 64-inch-wingspan Grumman Tiger Cat. Designed by an IBM electrical engineer, the original is powered by two O.S. .48 4-strokes and flies great, according to Bill. The kit will be offered in the usual G&P fiberglass, foam and balsa construction, and Bill states, "Two Sundays dedicated to construction, and the Tiger should be ready for paint and engines." The Cat sports 736 square inches of wing area and is recommended for .40 to .60 2-stroke and .48 to .70 4-stroke engines. For more information, call or write Bill at G&P Sales, 455 Sunset Dr., Angwin, CA 94508; phone/fax (707) 965-1216.

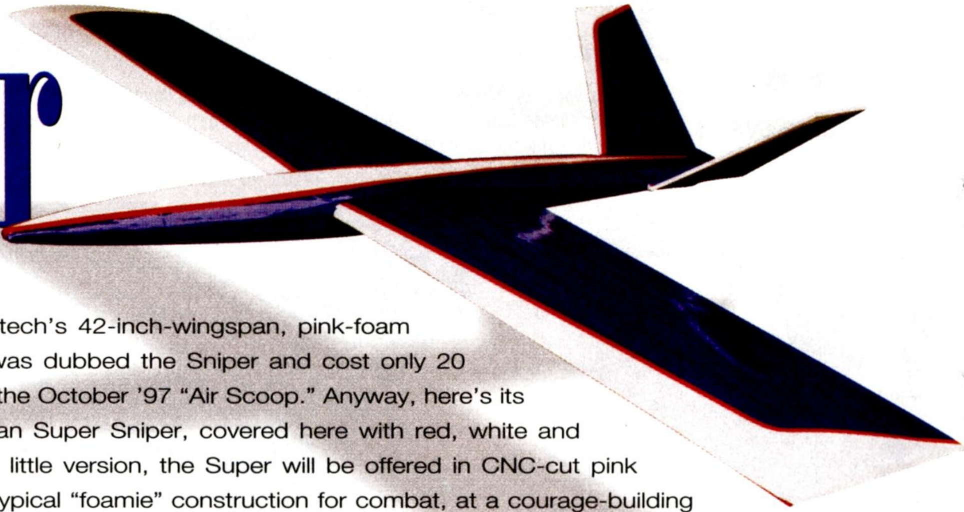
K&B have drawn on decades of experience manufacturing epoxy paints to formulate what they believe is the best and chemically safest epoxy paint for R/C aircraft. Ultrapoxy is durable, totally fuelproof and easy to apply. Two easy steps—one light dust coat followed by a final flow coat—give a great finish. According to K&B, the fast-drying finish has a high gloss that looks as if a clear-coat has been applied. While Ultrapoxy colors match the colors of most popular heat-shrink film coverings, they may also be mixed for custom paint jobs; mixing charts are available from your local hobby dealer. Ultrapoxy requires no thinner; however, a K&B solvent is available for cleaning spray equipment. For more info, contact K&B Mfg., 2100 College Dr., Lake Havasu City, AZ 86403; (520) 453-3579; fax (520) 453-3583.

ULTRAPOXY

O.S. .46 VX-DF

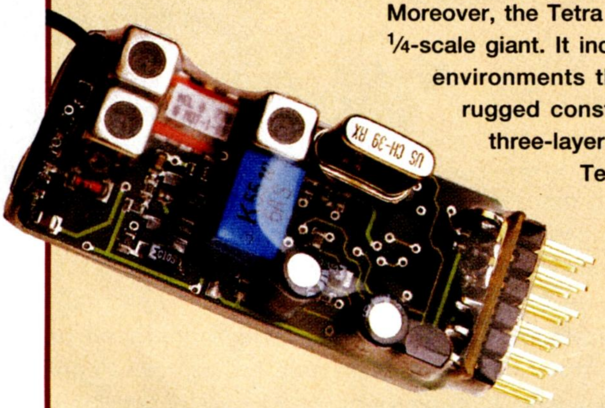
According to Great Planes, U.S. distributor of O.S. engines, advanced technology boosts the power of this new VX ducted-fan engine 25 percent over the .46 VR it replaces. These performance advancements include improved porting; bar-stock head; larger fin area for improved cooling; a redesigned, high-performance carburetor with better fuel metering; and a bolt-on exhaust adapter for increased tuned-exhaust flexibility. Since the VX boasts 2.5b.hp at 23,000rpm, O.S. apparently felt some "beefing up" was also in order. The all-new, one-piece crankcase features heavy-duty webbing to minimize distortion at high rpm. For more information, contact Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826; (217) 398-6300; fax (217) 398-0008.

Super Sniper



Do you remember JK Aerotech's 42-inch-wingspan, pink-foam combat slope soarer that was dubbed the Sniper and cost only 20 bucks? If you don't, look in the October '97 "Air Scoop." Anyway, here's its big brother: the 48-inch-span Super Sniper, covered here with red, white and blue packing tape. Like the little version, the Super will be offered in CNC-cut pink foam and packing tape, in typical "foamie" construction for combat, at a courage-building price of only $35 (shipping extra, of course). Also included are a hardware kit, a roll of colored tape and matching corrugated-plastic tail. Rumor has it that an EPP (polypropylene foam) version will be offered in the near future. Super Sniper retains the "family heritage" of being rugged, highly maneuverable and capable of handling the turbulent and gusty conditions those slopes can dish out. To personalize your Super Sniper, packing tape in six colors is available from JK, as is a handy tape machine that, according to the manufacturer, really helps in the construction of this type of model. For more information, contact JK Aerotech, 10800 S.E. Orient Dr., Boring, OR 97009; (800) 442-6755, or (503) 665-3824.

6-Channel RX



According to FMA, their Model 301 Tetra is the smallest, lightest, full-capability receiver available for use with AM or FM transmitters on 50, 53 and 72MHz. Moreover, the Tetra can be used in anything from a tiny indoor electric model to a ¼-scale giant. It incorporates an FMA proprietary RF mixer to permit operation in environments that are high in electrical noise. Reliability is enhanced by a rugged construction that uses surface-mounted components on a single, three-layer, epoxy/glass printed-circuit board.

Tetra uses Microlite antenna wire, which weighs less than half as much as conventional wire and, since 50-ohm impedance is used throughout, the antenna may be cut to as short as 18 inches for small models without de-tuning the unit.

2.13 x 0.8 x 0.55 inches!

SPECIFICATIONS

Ultimate bandpass: + or - 8.5KHz @ >55dB below peak
Sensitivity: > - 93dBm
Third-order intercept: +12dBm
Operating voltage: 3.5 to 26 volts

For more information, contact FMA Direct, 9607 Dr. Perry Rd., Ijamsville, MD 21754; (800) 343-2934; fax (301) 831-8987.

Palm-Grip Orbital Sander

Ryobi's model S551 1/6 Sheet Finishing Sander weighs only 2.1 pounds, fits in the palm of your hand and has a die-cast-aluminum paper plate that measures only 3x4.5 inches. For working in tight corners and on the compound curves of our models, this one sounds perfect to me. The S551 has an elliptical-orbit sanding pattern of 1/16 inch for fine finishing work, and it has a tough, 1.5A, nylon-housed, all-ball-bearing motor that produces a no-load speed of 12,000 orbits per minute. A 10-foot all-weather electric cord is standard equipment. For more information, call Ryobi toll-free at (800) 525-2579, or call Frank Coots at Ryobi North America, (864) 295-7739.

A LARGE LANIER BeGiles the Skies

For those of you who are looking for a big aerobatic machine, here's a quick peek at the latest from Lanier RC—a 92-inch-wingspan Giles 202. This large Lanier features all-wood construction with laser-cut balsa and light plywood parts and foam wing/stab cores. The only vacuum-formed parts are the cowl and the wheel pants. The 202 was designed for 3.7 to 6.0 2-stroke and 300 twin 4-stroke engines. For more information, contact Lanier RC, P.O. Box 458, Oakwood, GA 30566; (770) 532-6401; fax (770) 532-2163.

Ever wonder whether one of those transmitter trays used by many precision pattern flyers would smooth out your flying a bit? Some R/C'ers feel that no matter what your skill level, a transmitter tray is certain to make you a better pilot. Now, for only $19.95 (a limited offer good only until May 31, 1998), you can find out for yourself. With its built-in wrist rests, Robart's Super Tray places your hands in a natural position for optimum comfort and control. Imagine, all the stress and fatigue of holding your transmitter while trying to fly is suddenly gone. Your hands and forearms now focus on one important function—piloting! Designed to fit all standard-style transmitters (bells and whistles are no problem), the tray angles the radio and correctly positions the antenna for improved range. The Super Tray includes handy places for a glow starter and—possibly even more important to some—your favorite drink! For more information, contact Robart Mfg. Inc., P.O. Box 1247, St. Charles, IL 60174; (630) 584-7616; fax (630) 584-3712.

Super Tray $uper Price

AIRWAVES

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News**, 100 East Ridge, Ridgefield, CT 06877-4606; email **man@airage.com**. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.

THE ASP MYSTERY SOLVED

In the past, I have related my very poor experience with ASP engines, having said that I've never seen one run nearly to my satisfaction. On the other hand, we have seen some modelers here who are a lot smarter than I am who say that their ASPs run fine.

What the heck? Am I wrong, or are some people's standards very low as to what "running fine" is? Knowing that there are just too many competent, experienced people who are happy with their ASPs for it to be a fluke, I kept digging.

Something fell into my lap yesterday; an article in *Model Airplane News*, and it appears to shed some light. Mr. Lightning Rod himself, Chris Chianelli, wrote the article, which I consider excellent. (Kudos to Larry for unleashing him on the world.) The article addressed problems of ASP .90 engines running poorly, and focused on nitro, heat and compression. This may or may not apply to other displacements, but it should.

To make a long story short, Chris made four tests, each of which reduced compression effects progressively by reducing nitro and shimming the head. With the 10 percent and no shim, the ASP ran hot and poorly, just as I have observed in the past. The engine improved with each test until it ran acceptably with 5 percent nitro and one head shim. Voilà!

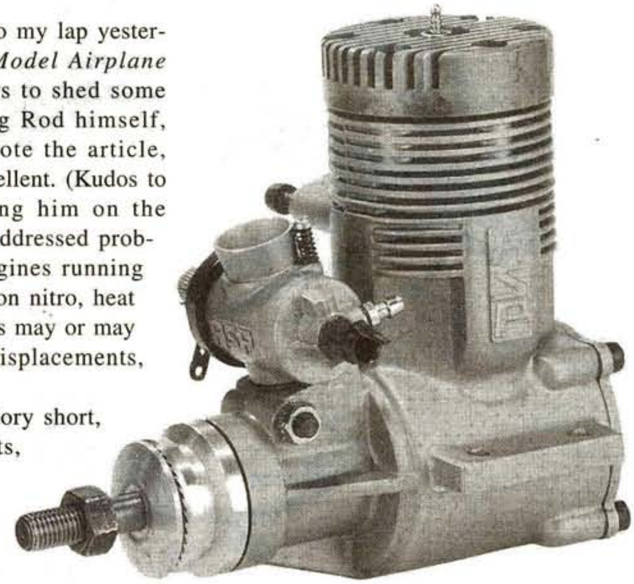
There's still a bit of a quirk here, because Webras and MVVS also call for low or no nitro, but handle 10 percent fine. No big deal, except it's hard to fuel different engines requiring a wide range of nitro. Shimming would be best in the USA, IMO.

So, ASP guys ... I knew you weren't lying to me, and I know I was not imagining all the poor-running ASPs. I'm not saying that this accounts for all ASP problems, but it could for most of them.

What I do need to say is that I assumed all ASPs ran poorly based on my experience, and we may now know why. BTW ... Cajun country is at sea level; hot and humid ... which only aggravates the compression/heat problem.

I would like to know which fuels and/or shimming have been used successfully in ASP engines, and at which altitudes and temperatures they are used. This could cement the solution to the mystery. [*email*]

BOB HUNDT



Bob, thanks for your response to Chris's article; we've gotten a bunch of them. Those letters, though, made us keenly aware that we left one important detail out of the article, which was: "What the heck size shim do you use, and how do you make it?"

We apologize for that omission. The shims are .020 inch thick, and I suppose you could cut them from sheet stock if you were really careful. But a much easier tactic is to pick up the phone and call ISC Intl., (317) 846-0766 and order part no. ASP9113 for your ASP .91, or ASP10813 for your ASP 1.08. LM

U-2 DUCTED-FAN CONVERSION

I recently purchased a set of plans for a 72-inch U-2 spy plane. The plans call for a .15 to .19 in the nose. I have been flying and building glow for about five years and would like to try my hand at electric. I have little to no experience with electrics and was wondering if it is possible—or feasible—to put an electric fan in this model. If it is possible, what kind of motor, fan and battery setup should I start looking into? [*email*]

TIM KEENEY

Do you have experience with ducted fans? When you move the thrust creator internal, you lose efficiency. To minimize those losses, you need to do proper ducting and such. Whether it's possible to redesign the internal structures of the particular U-2 you're referring to, I couldn't say. Realize that electric conversions, from glow planes, are often not successful because the airframes are too heavy, since they're designed to deal with vibration and fuel soaking of glow power.

I'd recommend that you give Bob Kress a call at Kress Jets, (914) 336-8149. Not only does he sell fans in the size you'd need, he does both glow and electric, so he'd be the guy to talk to. He may even know the plan you're talking about or at least how to get proper flow through a U-2. LM

FRISKET MASKS

I'm writing in regard to Jim Ryan's article on using frisket masks that appeared in the February 1997 issue of *Model Airplane News*. I recently used frisket film to paint the starburst pattern on a Super Decathlon model, with limited success.

Even though I tried to mist a light coat of paint on first, I still got some bleeding under the mask. I was painting Coverite 21st Century black over Cub Yellow; maybe my mist coat was too heavy. When I peeled up the mask, a lot of the adhesive stayed stuck to the base coat (Cub Yellow Coverite), although the mask did not peel off any of the base coat (which was good). The adhesive seemed to stick more strongly than I had expected. I was able to wash the adhesive off with alcohol, but the net

result was not as smooth as I had expected and is not really acceptable. My negative mask seemed to leave impressions in the coat underneath, even though the base coat had dried for a number of days before I applied the negative mask.

Fortunately, I only tried to paint one stab/elevator, so if I have to remove the paint and start over, I haven't lost too much time. I may be able to sand out the imperfections and "bleeds" and repair it rather than remove the entire paint job. Actually, I've had better luck using Scotch 471 tape, but masking a complicated pattern such as a starburst is a lot easier using frisket film, if I can get it to work.

Do you have any suggestions that might help me? Frisket film seems like a nice way to go, but my first attempt was not as good as I had expected.

Thanks very much for any suggestions you may have, and I really enjoy your "Cybernews" column. [*email*]

TOM MITCHELL

Tom, frisket is a handy material, but modelers use it with a wider variety of paints and surfaces than was originally intended, so the technique needs to be varied. First, a word about surfaces: frisket is intended as a low-tack film, and the smoother the surface, the better it holds. Conversely, if the surface is grainy or textured, the adhesion is not nearly as strong. On slick finishes like a fiberglass fuselage base-coated with high-gloss paint, the frisket only needs to be lightly smoothed down, while on a fabric-covered wing or an airframe painted in a matte finish, it needs to be rubbed down repeatedly to adhere properly. In such cases, it's cheap insurance to mist on a coat of clear before proceeding to the color coats; this will help to seal the edges and prevent bleeds.

Now for paints: frisket was originally designed for graphic arts applications, so it's intended for materials like water-based acrylics and mild enamels. However, modelers sometimes use tougher finishes like automotive paints and epoxies, and these finishes have aggressive solvents which can soften the adhesive on the frisket. While this gummy residue can be annoying, it isn't a major problem. When using such paints, I allow the paint to cure fully and then clean off the adhesive residue with denatured alcohol, which dissolves the residue but shouldn't attack the paint. If you find this unacceptable, urethane is one example of a fuelproof paint that will not react with the frisket. Another option is to remove the masks right after painting; this allows very little time for the solvents to attack the frisket, but increases the chances of smearing the paint.

Frisket film isn't a cure-all; it's just one more handy tool for creating a high-quality paint job. Good luck with your Decathlon! JIM RYAN

WANTS 3D AEROBATICS ARTICLES

In your editorial, you promised that Mike McConville would present a series of articles on doing 3D aerobatics. Since then, I have been awaiting each issue in the hope that a follow-up article would appear but to date, no luck.

Could you please get on Mike to finish up the series? I, along with my fellow club members, would appreciate it.

Enjoy your magazine; keep up the good work.

FRANK JEPSON
Glendale, AZ

It's true that I introduced the first of what I referred to as a series of articles on 3D aerobatics by Mike McConville in the May 1997 issue.

Since that time, however, Mike has gotten very busy, and he has not been able to continue with the writing. While this is unfortunate, and we'd like to see those articles, too, the guys who write in our magazine have "real" jobs and do their writing in their spare time. We modelers owe them a debt of gratitude for all their efforts. As we all know, our "spare time" often evaporates because of other demands in our life.

So it goes with Mike, who's very busy right now. Hopefully, sometime in the future, Mike will write those articles and we at Model Airplane News *will be ready and willing to present them to you.* LM

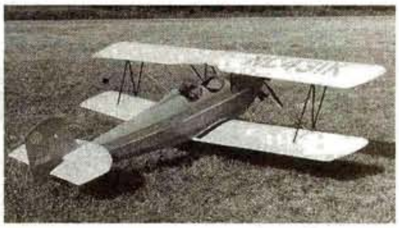
THINKING BIG

In reference to the new "Thinking Big" column in the March 1998 issue, indeed I do remember my first "big" model. It was a 36-inch-span Comet model of a Piper J-3 Cub. But this was in 1948, and the model only cost $1.25. Of course, things have really changed since then; the models keep getting bigger and bigger and cost more.

What I would like to see in your column are articles pertaining to engines; articles that would, for example, compare the new U.S. Engines powerplants to others of equal size, and talk about fuel mixtures and prop sizes. Also, where to find plywood in large sheet sizes. Keep up the good work.

BILL MACKINZIE
Taneytown, MD

Bill, thanks for your positive comments. I'll be writing "Thinking Big" with the sport modeler in mind and will try to address problems most newcomers are likely to encounter as they step up to larger-size models. As for engines, check out the column in this issue. The topic is basic gasoline-engine operation. I do plan to talk about building materials and wood sources in future issues, so stay tuned and think big! GY



CONCEPT MODELS ERRATUM

In his February '98 "Scale Techniques" column, George Leu references a Concept model. Problem: in the index, Concept is listed as Concept Technology, with a California address. Their correct name and address is: Concept Models, 2906 Grandview Blvd., Madison, WI 53713; (608) 271-5687.

Pilot PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1998. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606.

SEPECAT JAGUAR

Tony Kameen of Moreno Valley, CA, spent just under a year building this GR-1 from modified Keith James plans. The 48.5-inch-span model sports strobe, navigation and cockpit lights and semi-Fowler flaps. An O.S. .46 FX spinning an 11x7 APC propeller keeps the Jag airborne. Tony dressed up the model using Testors Model Master plastic enamels.

URAVITCH SE-5

Manny Sousa of Gulf Breeze, FL, sent this photo of his fun scale British WW I fighter that he built with Bob Stanley of Pensacola. The 74-inch-span model weighs 14.5 pounds and is covered with Koverall and painted with dope. Manny tells us, "It is more than adequately powered by an O.S. 120 Surpass turning an 18x5 prop, and it flies beautifully with Airtronics guidance."

AD4 SKYRAIDER

Bill Luig of Horsham, PA, spent 150 hours building this 100-inch-span model using Ziroli plans. The model is finished with fiberglass and paint and uses a Sachs 4.2ci engine for power. In his quest for scale realism, Bill visited the Smithsonian Restoration facility in Suitland, MD, to take photos of their AD4. Tom Haacke sent in this photo.

ARADO 68

Néstor Londono of Cali, Colombia, built this Arado 68 from Chester Lanzo plans he ordered from *Model Airplane News* in 1964. Néstor modified the plan to have a fiberglass cowl, foam wings and a bigger engine, namely a SuperTigre .60. The model is covered with MonoKote.

HANAUSHER BUSH RED WOLFE

This P-51 from Jim Meister plans is the handiwork of Jean Chevalier of Quebec, Canada. The 20-pound model is powered with a Quadra 42 and is covered with Super Coverite and Randolph dope. Jean writes, "It flies great, and the flaps on this one are very effective."

DUELLIST ON FLOATS

Bill Wiens of Vernon, British Columbia, Canada, built this Pica Duellist and gave it two Saito 50S 4-strokes for power. Bill finished the model with K&B epoxy and writes, "It flies like a dream when both engines are running; with the floats there, it is too much yaw when one quits. I've got to be quick to shut off the other engine to land safely."

1/6-SCALE STINSON

Jerry Farr of Abilene, TX, sent this photo of his designer-scale Royal Navy model. It has an 84-inch wingspan, weighs 7 pounds and uses a Saito .90 4-stroke for power. Jerry writes, "Rib-for-rib and stringer-for-stringer construction kept the weight down ... this is an excellent scale subject in civil or military finish."

PROCTOR BONES

This uncovered Proctor Jenny is the handiwork of Sid Sherman of Philadelphia, PA. Sid rigged the 87-inch-span model with cable-operated controls and 103 operational turnbuckles. He says that he has spent about 1,500 hours on the bones alone; he plans to spend another 500 hours on covering, rib stitching and pinking. He also writes, "This was more of an engineering project than building a model airplane."

WACO VKS

Don Harbin of Flushing, MI, built this 1/5-scale model from Norm Rosenstock's plans. The WACO weighs 14 pounds and has functional rotating beacon and running lights, is covered with Coverite and dope and has an O.S. 120 Surpass in its nose. Don tells us that his son Dennis owns the full-scale version.

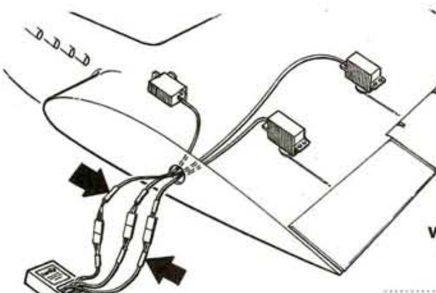
CORONET 150

Norman Anderson of Newport, RI, built this model using D.B. Mathews plans from *Model Aviation*. The 72-inch-span model weighs 68 ounces and is powered by an O.S. FS .40 4-stroke. Norman covered the model with Ultracote and writes, "It flies like a feather; handles like a pussycat."

Hints & KINKS

by JIM NEWMAN

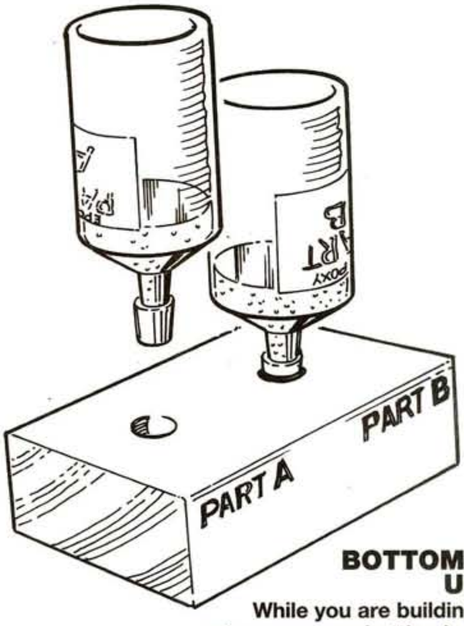
Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



COLOR MATCHING

When several servo leads enter the radio compartment, as shown here, code the various servo leads with colored heat-shrink sleeves. This makes it easy to match them to the proper receiver leads. Patches of colored tape on the plugs will work, too.

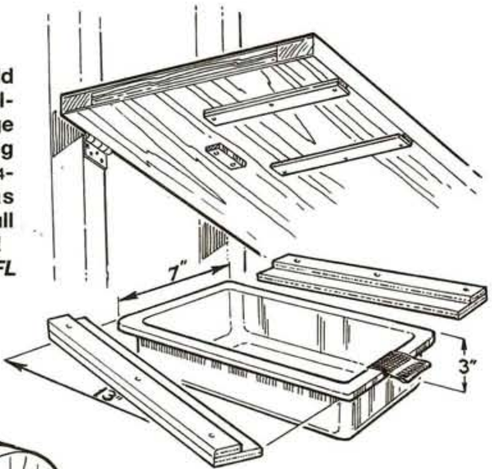
Dale Van Der Ploeg, Henison, MI



BOTTOMS UP

While you are building, set your epoxy bottles in a drilled wood block so that the epoxy is in the top of the container, ready to use. This avoids that agonizing wait while the epoxy flows to the nozzle each time you need it and is especially useful when the bottle is partly empty.

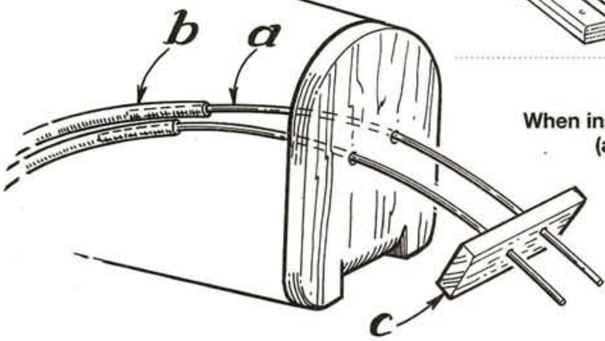
Glenn Bolick, Mechanicsville, VA



RICHARD'S DRAWERS

One of many who builds on an old door, this modeler used $1 shallow plastic boxes for tool storage space that does not take up leg room. He mounted them on ¼-inch (6mm) plywood slides as shown. The high-tech drawer pull is a tab of high-quality duct tape!

Richard Mazourek, Sebastian, FL



DO WACKER DO

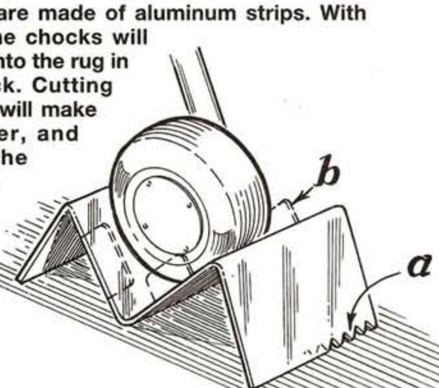
When installing the fuel tank, pass two pieces of 0.090-inch (2.5mm) weed-wacker line (a) through the firewall, then push them into the ends of the fuel lines (b). The fuel lines will then easily follow the pieces of nylon line through the firewall. Jamming the ends of the nylon line into a small block of wood (c) will make them more manageable.

Ken Casser, Manhasset, NY

TIN BASHED CHOCKS

These simple chocks are made of aluminum strips. With the model in place, the chocks will dig into the ground or into the rug in the back of your truck. Cutting teeth into the ends (a) will make them grip even better, and bending tabs up at the sides (b) will stop the model from sliding sideways out of the chocks when it's in your truck.

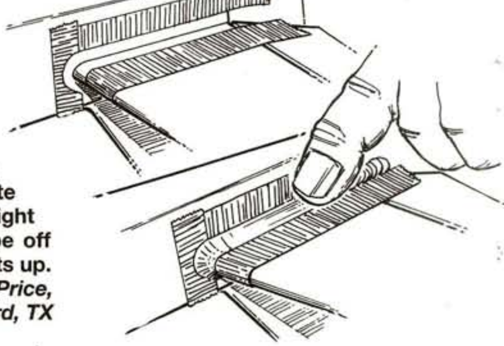
Patrick Young, Barrie, Ontario, Canada

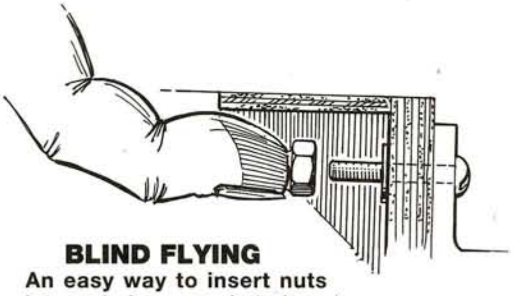


SLICK JOINT

Mask off a strip approximately ⅛ inch (3mm) wide, then apply a fine bead of RTV tub seal. Smooth this into the corner with a wet finger to create a neat, clean, oil-tight fillet. Peel the tape off before the RTV sets up.

Clay Price, Weatherford, TX

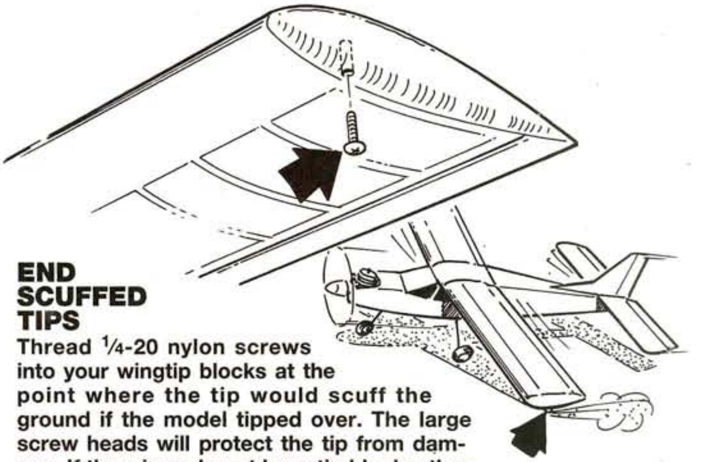




BLIND FLYING

An easy way to insert nuts into a dark, concealed place is to glue them to your fingertip with PFM or GOO. After the nut has been tightened, your finger will easily peel away from the nut.

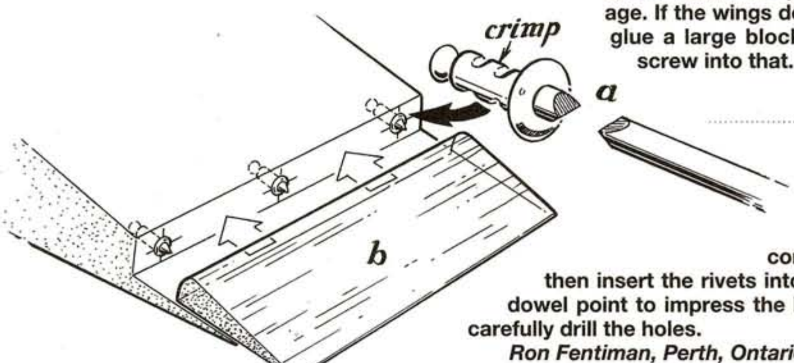
Ron Fritz, Kent City, MI



END SCUFFED TIPS

Thread 1/4-20 nylon screws into your wingtip blocks at the point where the tip would scuff the ground if the model tipped over. The large screw heads will protect the tip from damage. If the wings do not have tip blocks, then glue a large block to the tip rib and insert the screw into that.

Donal Kavanagh, Sun City West, AZ



CENTER POINT

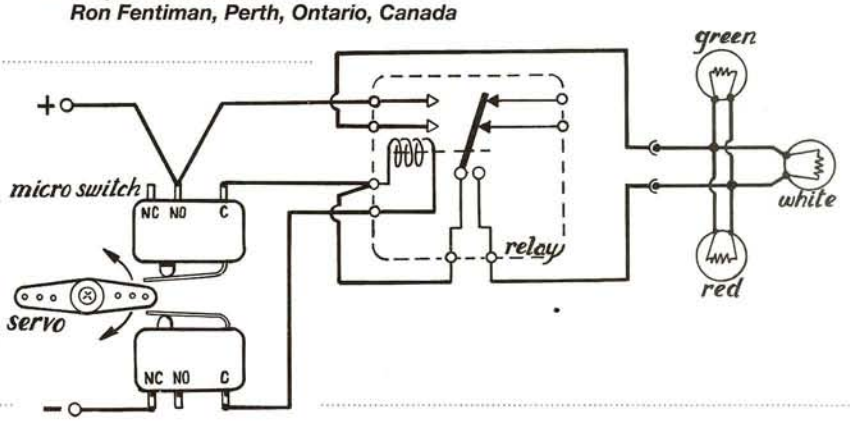
Using modified pop rivets as cabinet maker's dowel points allows you to accurately match up the hinge points in flaps and controls. Clip off the mandrel (a) with wire cutters, then insert the rivets into the hinge holes. Push the flaps (b) against the dowel point to impress the hinge positions into the flap leading edge, then carefully drill the holes.

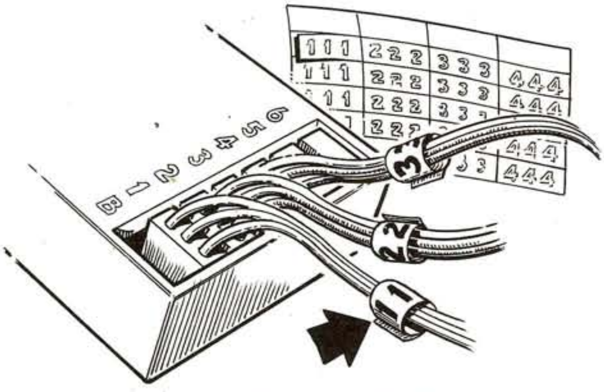
Ron Fentiman, Perth, Ontario, Canada

SON OF FLICKA

This engineer gives us a neat and tidy method of "latching" lights on by using a single RadioShack miniature relay that has at least two sets of contacts. A flick of a transmitter AUX switch one way will turn them on, and a flick in the opposite direction will turn them off.

Glen Taylor, Ingersoll, Ontario, Canada





SERVO LEAD ID

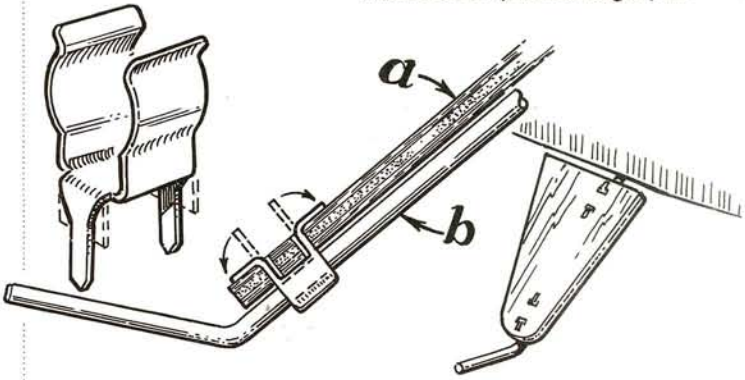
Identify which sockets your servo leads plug into by wrapping electrician's self-stick wire markers around each lead. The markers are 25¢ per sheet from electrical stores.

James Opper, Williamston, MI

CLIP JOINT

Clip plywood landing-gear fairings to the gear leg using RadioShack circuit board fuse holders. Clip the holder around the wire leg (b), push the tangs through small holes in the plywood (a), then bend the tangs over.

Gene DeCook, Canandaigua, NY



18 years of open comp

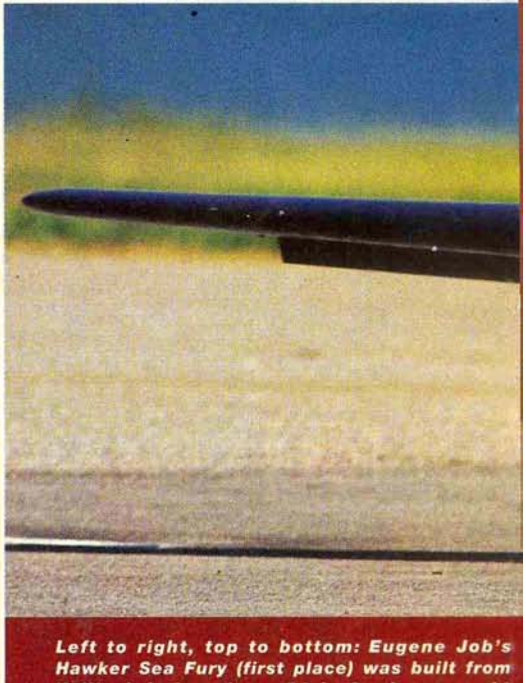
SCALE MAST

CHAMPIONSH

by JERRY NELSON

The 18th annual Scale Masters Championships were held September 18 to 21 at the Irving R/C Flyers Association North Lake Park flying site, near the Dallas-Ft. Worth airport. Harris Lee deserves the credit for starting and continuing to run the Scale Masters organization. Kent Walters has also provided assistance for many years. The rules have been developed over the years by interested scale modelers throughout the U.S. and are similar to AMA and FAI rules, with a few differences. What is unique about the Scale Masters competition is that all contestants must qualify in regional competitions held around the U.S. No one is invited to attend; to qualify, you must place in the top 30 percent of the qualifying scores in regional competitions. More than 100 competitors each year qualify for the finals, but for various reasons, not all of them compete in the championships. This year, 41 competitors entered and made official flights.

PHOTOS BY JERRY NELSON



Left to right, top to bottom: Eugene Job's Hawker Sea Fury (first place) was built from Vailly Aviation plans; 90-inch wingspan; 41 pounds. • Kent Nogy's BVM F-4 (fourth place) looked just like the real thing; fiberglass fuselage and balsa-covered foam wings and tail;

ition

ERS

IPS

two BMV 91s; 25 1/4 pounds. • Patrick McCurry's own-design ME-109 (fifth place) uses a Zenoah G-62 for power; 102-inch wingspan; 43 pounds. His routine of aerobatic fighter-type maneuvers appeared to be effortlessly accomplished. • Mike Barbee's B-29 (eighteenth place) flew magnificently, and the sound of the four Saito .90 4-strokes was awesome. Even at 43 pounds, the 141-inch model has plenty of power to fly. • Corvin Miller designed this Globe Swift (third place) and outfitted it with operating lights and flaps; O.S. 160 4-stroke twin; 80-inch wingspan; 21 1/2 pounds.• Charlie Chamber's P-61 (second place) was built from modified Don Smith plans; two Webra 1.20s; 38 pounds.

In 1998, any contestant who competes in at least three Scale Masters Championships qualifies automatically, provided that the contestant makes an official flight at one of the 1998 regional qualifiers. This great idea will allow more contestants to compete at the Scale Masters Championships.

THE COMPETITION

The Irving R/C club flying site is outstanding. This world-class facility is located on City of Irving park property. The hard surface runway is over 700 feet long, and formal covered pit areas are provided. Excellent protective fencing ensures safety for all those involved.

Credit is certainly due to the Irving R/C club, which provided the personnel to organize and run the competition. Contest director Ernest Harwood (a world-class competitor in his own right) did whatever was necessary to present a very well-run competition that was worthy of selecting the 1997 Scale Masters Champion.

The competition is divided into two segments: static and flying. The static portion covers outline, markings and workmanship, and the maximum static score is 100 points. The static judging was done at the

PERFECT STAT

SOPWITH PUP

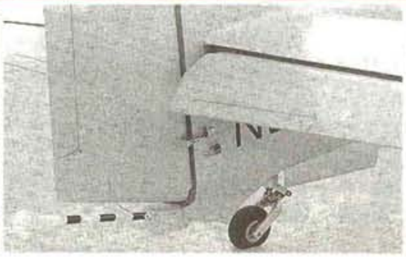
Mike Winter's ⅓-scale Sopwith Pup started out as a Balsa USA kit, and then he added a great amount of scale detail. All the flight controls are operated with scale pull/pull cable systems. With a 106-inch wingspan, 27 square feet of wing area and a 77-inch-long fuselage, this model is big—really big! At 52 pounds, it was the heaviest model at the competition.

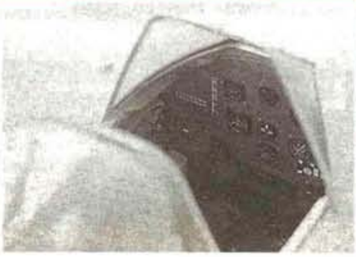
The covering was polyester fabric attached with Sig Stik-It, and the painting was done with dope. The Pup's 9-inch wheels were homemade from radiator hose material. A Sachs 4.2 turning a 24-10 Zinger prop about 7200rpm provides a realistic amount of power. A C&H ignition system replaced the stock magneto system supplied with the engine.

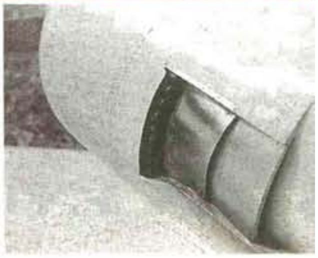
Grand Champion

The scale detail on Eugene Job's Hawker Sea Fury is exceptional. The full-size aircraft is based in the same town where Eugene lives and has been raced for several years at the Reno Air Races. The model was built from Vailly Aviation plans with minor changes. Its wood framework is covered with Parson's fiberglass cloth, and simulated rivets duplicate the scale metal structure. Eugene used the same WLS Coating paint that was used on the original, and special markings were made. The markings of the sponsors and crew members on the landing gear covers are perfect. Eugene has been flying the aircraft for three years.

The canopy opens, and full cockpit detail is provided. Eugene's nearly perfect 98-point static score and an average 96.33 flight score put him in first place by a comfortable margin; his flight score was the highest in the championships. The 90-inch-wingspan, 41-pound aircraft has had over 100 flights.







C SCORES!

FOKKER D-VIII

Wayne Frederick is a team member for the 1998 Scale Internats in South Africa. The D-VIII he entered in this competition is his backup aircraft; can you imagine what his number one D-VIII is like? We wish him luck at the Internats.

Wayne's model was built from his own plans using a computer-aided design (CAD) drawing system. The aircraft is made using many different kinds of construction, mostly molded fiberglass skins over foam inner cores. The 15-pound aircraft has an 84-inch wingspan and is powered by an O.S. 1.6 4-cycle twin.

WINNERS

PLACE	NAME	MODEL	TOTAL SCORE
Propeller Class			
1	Eugene Job	Hawker Sea Fury	194.33
2	Charlie Chambers	P-61B Black Widow	193.42
3	Corvin Miller	Globe Swift	190.92
4	Patrick McCurry	ME-109G6-R6	189.83
5	Mike Winter	Sopwith Pup	189.58
6	Gary Parker	JN4D Curtis Jenny	189.58
7	Joe Topper	Nieuport 28	189.08
8	Bob Underwood	Hiperbipe	187.58
9	Dick Hansen	Curtis Jenny	187.42
10	Brian O'Meara	Hawker Sea Fury	187.33
Jet Class			
1	Kent Nogy	F-4 Phantom	190.08
2	Shailesh Patel	F-4 Phantom	189.42
3	Scott Foster	F-4 Phantom	184.25

Other Awards

PILOT'S CHOICE	Mike Barbee	B-29 Super Fortress
BEST KIT BUILT	Mike Winter	Sopwith Pup
BEST SCRATCH BUILT	Wayne Frederick	Fokker D-VIII
BEST MILITARY	Charlie Chambers	P-61B Black Widow
BEST CIVILIAN	Bob Underwood	Hiperbipe
BEST JET	Shailesh Patel	F-4 Phantom
BEST PROP	Corvin Miller	Globe Swift
BEST MULTI ENGINE	Charlie Chambers	P-61B Black Widow
ELECTRIC	Robert Benjamin	Taylorcraft
ELECTRIC	Randy Smithhisler	Piper PA-12

Cavanaugh Flight Museum on Thursday. Results of the judging are withheld until the first round of flying has been completed.

This flight score is made up of two mandatory maneuvers (a figure-8 and an inspection pass or fly-by) and seven other maneuvers that are selected by the contestant from an almost unlimited list. Usually, these maneuvers are typical of the aircraft flown, i.e., a B-29 will drop bombs and an Extra 300 aerobatic airplane will do snap rolls. Another 10 points is given for realism. A total of 100 points is possible for the flying score. The best three flights are averaged to obtain the flying score, and the static and average flight scores are added to obtain the final score with 200 points possible. Five rounds were flown: two each on Friday and Saturday, and one round on Sunday.

There are two championship categories: propeller and jet. The highest static and flight score—regardless of the categories—decides the overall grand champion—the best of the best!

Last year's grand champion flew a jet. It was obvious at last year's championships that the jet aircraft (four were entered) had a greater opportunity to obtain high scores. Afterward, many modelers felt that if you wanted to win, you had to have a jet. That was not the case this year—a Sea Fury was first, a twin engine P-61 fighter was second and a civilian Globe Swift tail-dragger was third. A Phantom jet took fourth place and a WW I Sopwith Pup biplane was fifth. Obviously, any type of aircraft can be competitive if it is properly constructed and flown.

Shailesh Patel's F-4 (eighth place) uses 21 servos scattered throughout the airframe to work its complex control system.

Bob Underwood's tenth place Hiperbipe was perhaps the most unique aircraft at the Championships. The unusual design feature is that the fuselage is the same width through its entire length; 72-inch wingspan, 15 1/2 pounds; O.S. 160 4-stroke twin.

JUDGING

Static scores this year were perhaps at record high levels. There were two perfect scores of 100, two 99.5s, one 99.0 and eight 98.0s. Static and flight judging are subjective. At this point, we must respect the volunteer judges and thank them for their work and participation. Without them, there would be no competition. However, it was obvious to many of those attending that the

SCALE MASTERS CHAMPIONSHIPS

FINAL STANDINGS

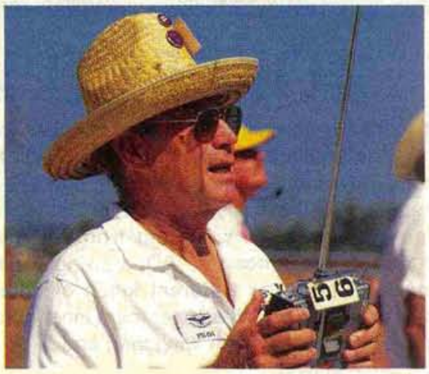
Overall Place	Name	Airplane	Static Score	Total Score
1	Eugene Job	Hawker Sea Fury	98.00	194.33
2	Charlie Chambers	P-61B Black Widow	99.50	193.42
3	Corvin Miller	Globe Swift	99.00	190.92
4	Kent Nogy	F-4 Phantom	98.00	190.08
5	Patrick McCurry	ME-109G6-R6	98.00	189.83
6	Mike Winter	Sopwith Pup	100.00	189.58
7	Gary Parker	JN4D Curtis Jenny	96.00	189.58
8	Shailesh Patel	F-4 Phantom	98.00	189.08
9	Joe Topper	Nieuport 28	98.00	189.08
10	Bob Underwood	Hiperbipe	99.50	187.58
11	Dick Hansen	Curtis Jenny	93.00	187.41
12	Brian O'Meara	Sea Fury	98.00	187.33
13	Mike Brewer	Aeronca LC	97.50	184.92
14	Wayne Frederick	Fokker D-VIII	100.00	184.25
15	Scott Foster	F-4 Phantom	98.00	184.25
16	Lee Rice	F4U Corsair	97.00	183.17
17	Max Ficken	Fokker Dr.1	94.50	182.75
18	Mike Barbee	B-29 Super Fortress	95.00	182.75
19	Robert Benson	T-34C Mentor	96.50	182.33
20	Dave Levitt	HC-130 Hercules	97.00	181.25
21	Gary Fuller	P2V Neptune	93.50	180.92
22	John Ostmeyer	Waco F-5	94.00	180.17
23	Paul Pollock	PT-22	94.50	179.50
24	Bill McCallie	P-51D Mustang	96.00	177.83
25	Alan Senn	Space Walker	98.00	177.33
26	John Cole	DeHavilland DH-1	96.50	176.58
27	George Jenkins	AD4B Skyraider	92.50	175.42
28	Ed Terry	1930 Fleet	90.50	175.42
29	Micha Sadler	Space Walker II	96.50	174.75
30	Jeff Lovitt	DHC-1 Chipmunk	96.00	174.50
31	Robert Benjamin	Taylorcraft BC-12-D	96.00	173.08
32	Charles Baker	PT-26	97.00	170.92
33	Randy Smithhisler	Piper PA-12	90.00	169.58
34	Jack Dorman	SBD-5 Dauntless	96.50	169.50
35	Gary Boucheri	Extra 300S	94.50	167.08
36	Charles Viosca	Super Cub	96.50	163.92
37	Manny Sousa	Grumman Skyrocket	96.50	139.58
38	Lawrence Harville	F6F Hellcat	87.50	137.58
39	Al Kretz	Spitfire Mark X	96.00	131.37
40	Doug Cramley	Stinson L5	96.00	129.75
41	James Hammond Jr.	Spitfire Mark V	94.00	107.50

Above left: Lee Rice built this F4U Corsair from a modified Royal Products kit; sixteenth place; 76-inch wingspan; 19 pounds; O.S. 108 glow engine. Above right: Max Ficken designed this 30-percent-scale Fokker Dr.1 model; Saito 300 4-stroke twin; 84-inch wingspan; seventeenth place.

static scores were unrealistically high.

The outline and markings (painting) are scored 15 feet away from the model. Workmanship scoring is done at five feet. The judge doesn't actually touch the aircraft, but he comes very close. Any errors in construction can usually be seen.

As we discuss the flight judging, we again have to thank the flight judges for their hard work—especially for sitting out on the flightline in the 90- to 100-degree weather. As with static judging, flight judging is very subjective and is subject to human opinion. I thought the judges were too easy when they scored the flight



Dick Hansen is a master at flying WW I models, and his flight score was the second highest in the competition. Especially good was the precision of his mandatory figure-8 maneuver.

maneuvers. Some very high flight scores were given for maneuvers that obviously were not worth the score given. The entry, position and exit portions of the maneuvers did not appear to be important; only the maneuver itself was judged.

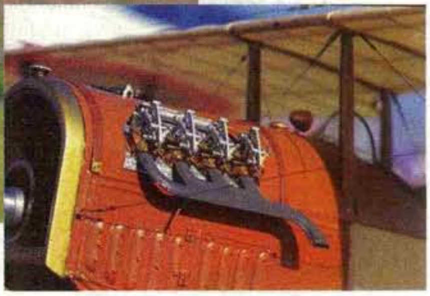
SCALE TRENDS

Trends of aircraft types flown in competition are interesting to examine. Similar to last year's championships, WW I aircraft scored very well in the static judging. It's interesting to note that the three jets entered (all Phantom F-4s) received the same static score. Each one was painted differently, too. As previously mentioned,

A first-time Masters' competitor, Alan Fenn received a 98 static score and placed twenty-fifth with his 1/3-scale Sig Space Walker. Alan designed his own scale landing gear from 4140 steel tubing using full-scale drawings sent by Hazel Sig.

Dick Hansen built this 10-year-old Jenny (eleventh place) from a Proctor kit. An Enya 80 4-stroke flies the 9¾-pound aircraft with enough power to easily perform loops and Immelmanns.

Gary Parker took seventh place with his backup model, a JN4D Curtis Jenny. As he loaded his van with his beautiful WW I Proctor Albatross, the garage door accidentally came down on the rear portion of the fuselage, breaking it in half. The Jenny weighs only 9¾ pounds and has an 87-inch wingspan.



any aircraft type could have won this competition, and that's the way it should be. My previous criticism of the judging process perhaps is not fair, since the judges certainly didn't favor one type of aircraft.

This competition lacked many original designs. Out of the top 10, only three were original designs; all the others were from kits or plans. There were fewer spectacular aircraft this year, but all eyes were on Mike Barbee's giant B-29 bomber and Charlie Chamber's P-61 Black Widow; both are extremely realistic in the air. Mike Barbee's B-29 had a 95 static score; very respectable, especially for such a complex aircraft. Mike was presented the Pilot's Choice award for his efforts. This award is as respected by the competitors as is the overall champion title. Charlie placed a well-deserved second with his P-61.

Championships organizer Harris Lee made sure the event ran smoothly.

Scale Masters
SPONSORS

Events such as the Scale Masters require considerable funding. The entry fee is minimal, so the money comes from sponsors and donations. Special credit must be given to Pacer (Zap) Technology. Without their support, this event may not have been possible. Proctor Enterprises should also be thanked for their financial support. Please support these sponsors with your hobby purchases to thank them for their support of this contest.

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Bob Holman Plans
Bob Violett Models
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Nick Ziroli Sr.
Norvel
Pacer Technology (Zap)
Proctor Enterprises
Prop Wash Video
Radio Controlled Models Inc.
Robart Mfg.
Scale Model Research
Tower Hobbies

ELECTRIC SCALE

We must not forget the two electric-powered entries: Bob Benjamin's Taylorcraft and Randy Smithhisler's Piper Super Cruiser. This is the second time that Bob has flown an electric entry and the first time that there have been two electric entries in the Scale Masters Championships. Both aircraft flew realistically and had enough power and battery duration to perform the flying segment of the competition. An Astro 90 motor and 35 Sanyo 1700mAh batteries were used in both aircraft, with excellent results. It is obvious that a world-class electric-powered aircraft could be competitive in the top level of scale competition.

The 1998 Scale Masters Championships will be held in Columbus, OH, in September '98. The static judging and

Charlie Viosca's entry started out as a Balsa USA Super Cub kit. It has a 141-inch wingspan and is powered by a Brison 4.8.

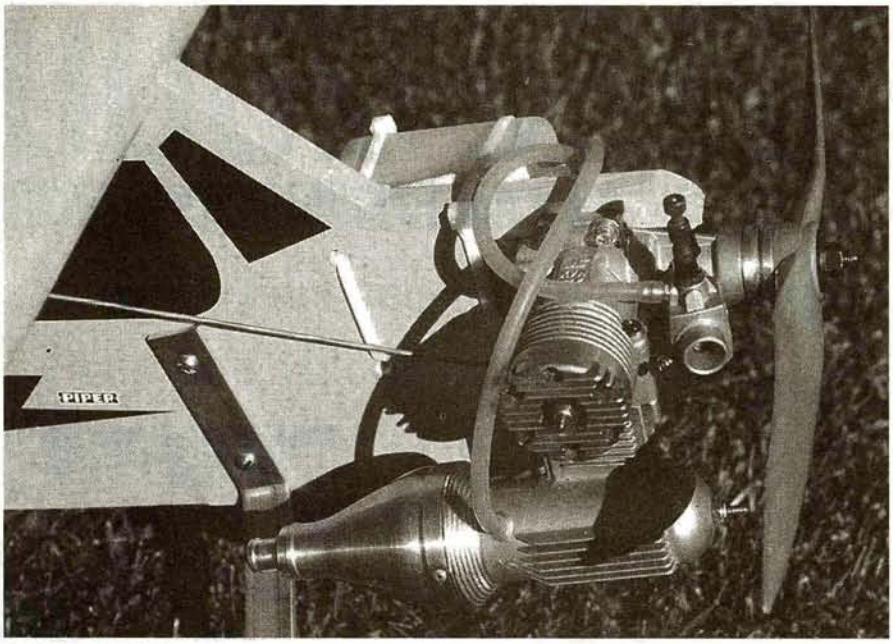
banquet will be held at the Air Force Museum in Dayton, OH. For more information on this year's championships and dates/locations of the qualifier competitions, contact Harris Lee, 4986 Lamia Way, Oceanside, CA 92056. Please send an SASE with your request.

LANIER RC Pro-Cub

A classic trainer goes fun-fly!

by MIKE DEHOYOS

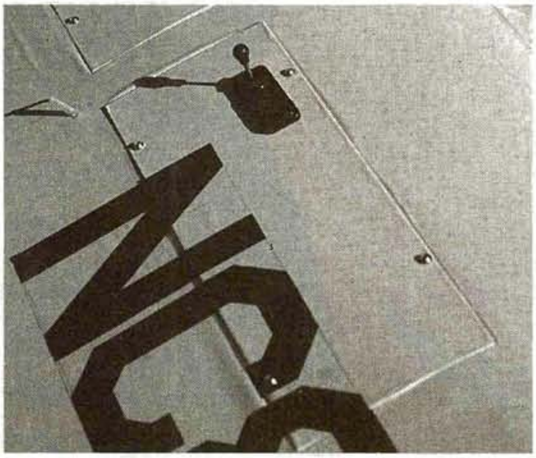
WHO EVER HEARD of a fun-fly Cub? Well, no one—until Bubba Spivey of Lanier RC* decided it was time for the classic trainer to enter the marketplace with a flattened disposition. Lanier has a reputation for manufacturing good, solid performing models. Bubba Spivey and his crew are well known for their extreme flying skills and their good-natured, down-home demeanor. If you've ever seen Team Lanier fly, then you know they enjoy themselves and know how to spell fun. Lanier's Pro-Cub perfectly fits the definition of fun, and it's a welcome addition to the world of profile flyers.



An O.S. .46 spinning a 10x6 propeller keeps the Pro-Cub on center stage at the field.

LET'S GET STARTED

A word of caution: this is not a beginner plane; it is highly maneuverable and should be operated by an experienced pilot. Before I build any kit, I like to study the plans and the manual to highlight any special details. I found the manual to be very clear and easy to follow. The quality of the materials in this kit is outstanding; the laser-cut parts are a plus for any kit because sanding and trimming are minimal. The plans were very detailed and precise.



The radio hatch provides easy access to the electronics; a nice feature that keeps time on the ground to a minimum.

I built the tail surfaces first. The tail is built of laser-cut balsa stock that has scarf-type joints. This provides additional surface area for gluing, and it makes the joint stronger. The tail surfaces are trussed for greater strength and weight savings. I sanded the tail feathers and beveled the control surface.

I started to build the fuselage by laminating the two center laser-cut balsa core pieces with 15-minute epoxy, making sure that all the lightening holes were aligned. While the glue cured, I built the tail of the aircraft. The tail is of truss construction and is simple to build. I cut the top and bottom balsa pieces of the rear fuselage and pinned them over the plans. Next, I glued the stabilizer mounting support into place. I installed the trussing according to the plans and glued it into place with CA. I used a scrap of balsa to make sure I had enough room for the stab mounting location. I then epoxied the plywood sides into place and sheeted the fuselage tail with balsa. I flipped the fuselage over and repeated the procedure for the other side. Two hardwood rails for mounting the engine to the fuselage are supplied in the kit; I epoxied them into place and set them aside to dry. After a light sanding, I set the fuselage aside until I finished building the wing.

PHOTOS BY LARRY MARSHALL

WING CONSTRUCTION

Remember that the wing is built upside-down over the plans. I started by pinning the spar over the plans. The ribs come with notch tabs, which help during the building process, and there's a notch for the trailing edge to sit on during the construction of the wing. I tacked ribs R3 and R5 into place, making sure that they were at 90 degrees to the spar. I then found the center plywood brace and epoxied it to the lower spar.

SPECIFICATIONS

Model: Pro-Cub

Manufacturer: Lanier RC

Type: fun-fly profile

Wingspan: 50¼ in.

Length: 42 in.

Wing area: 688 sq. in.

Airfoil: symmetrical

Weight: 4 to 5 lb.

Channels required: 4

Engine req'd: .32 to .46 2-stroke or .26 to .56 4-stroke

Engine used: O.S. .46 SF

Prop used: Master Airscrew 11x5

List price: $115.95

Features: AutoCAD-generated plans; laser-cut interlocking construction; full symmetrical airfoil; CNC-router-cut parts; tabbed wing construction; built-up profile fuselage; easy-to-follow plans and instructions.

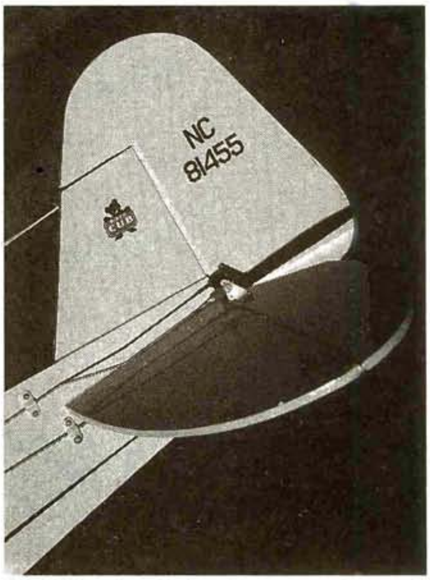
Comments: the Pro-Cub is highly maneuverable and should be operated by an experienced pilot. The quality of the materials in this kit is outstanding, and the plans were very detailed and precise.

Hits

- Fast assembly.
- Light and easily maneuverable.
- Easy access to electronics.

Misses

- No hardware included.



The tail and control surfaces are strong and light.

I finished gluing the rest of the ribs to the lower spar, with the exception of R1 and R2, which will be glued in after the wing is fitted temporarily to the fuselage. I glued the trailing edge and sheeting into

FLIGHT PERFORMANCE

• *Takeoff and landing*

With controls set on low rates, the Pro-Cub used about 20 feet of our grass runway for a normal takeoff. With its constant-chord symmetrical wing and coupled ailerons (flaperons) and elevator, pitch control is very positive. Powered by an O.S. .46 turning a 10x6 prop, the climb rate is awesome. It would be very easy to simply firewall the engine and stand the model on its tail for near-vertical climbout. Performance is definitely more like that of a fun-fly ship than a Cub.

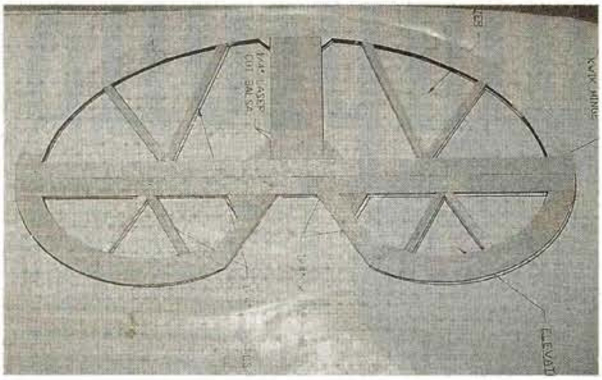
For landings, you should keep on the power a bit and prevent the airspeed from bleeding off too much. If you get it low and very slow, low rate controls will be diminished, and control will become sluggish. To stay out of trouble, keep some power and have high rates on.

• *General flight performance*

Once you get past the fact that you indeed have a hotshot fun-fly model on your hands (even though it looks like a Cub), you can really wring this model out. On the first flight, the model felt like it wanted to climb under power but did not feel tail heavy. A few clicks of flaperon trim quickly had the model flying straight and level. Because it's a little heavier than a true wing-and-stick fun-fly airplane, the Pro-Cub likes to fly at a somewhat faster airspeed than its lighter cousins. Properly trimmed and with about ½ throttle, the Pro-Cub grooves nicely and is fairly stable, considering its straight wing design. Not that it's a hands-off type of model—it's not—but you don't have to fight it all the time, either.

• *Aerobatics*

Now this is what the Pro Cub was really designed for. Roll rate is definitely not Cub-like; it's more like a Fun-Fly Hots. If I had to guess, I'd say it is in the neighborhood of 2 to 3 rolls per second, and I had to practice before I could exit a full-deflection roll straight and level. Once you get the hang of it, however, you'll find that roll response is very crisp and that 4-point and more point rolls are very axial. Inverted flight requires only a whisper of down-elevator, and knife-edge is fairly easy with that big, flat fuselage helping to create lift. A surprisingly little amount of rudder is needed to set up the maneuver. Loops can be very tight, and they happen very quickly. Spins and snap rolls are easy to execute, and if done on high rates, are pretty spectacular to watch. I just sorta moved the sticks and closed my eyes! If you have just a bit of the "crazy farmer" in you, you'll love Lanier's Pro-Cub.



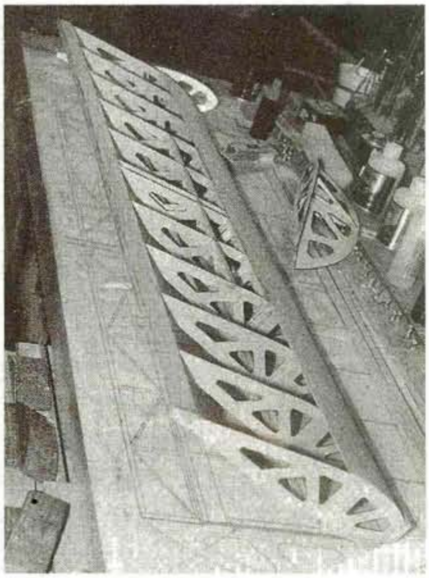
The Pro-Cub's tail is built of balsa stock that has scarf-type joints, and its surfaces are trussed for greater strength and weight savings.

place, making sure that the ribs were in the location shown on the plans. Hardwood rails that serve as servo mounts are then added to the wing. I trimmed the trailing edge sheeting where the fuselage is inserted into the wing and temporarily mounted the wing to the fuselage, making sure that it was aligned properly to the fuselage. I then tack-glued ribs R1 and R2 to the spars. I removed the wing from the fuselage and permanently glued ribs R1 and R2 in place. The rest of the wing was completed according to the instructions.

FINISHING UP

I used 15-minute epoxy to attach the wing to the fuselage and to install the tail feathers. I covered this project in the traditional Cub yellow by MonoKote*, also using MonoKote trim sheets for the graphics. An O.S. .46SF provided more than enough power for this plane to cut up the sky. A Great Planes* 6-ounce fuel tank provided 10 minutes of great flying. I installed the landing gear and tailskid at this time.

I used a JR-388S for guidance. The



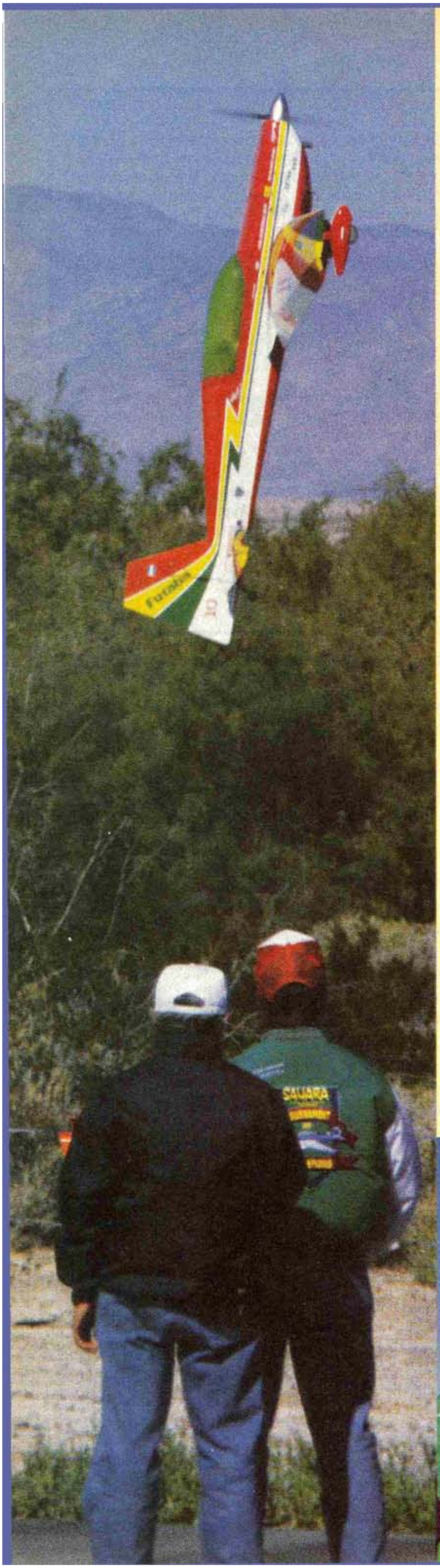
The Pro-Cub wing is built upside-down over the plans.

large hatches in the Pro-Cub provide easy access in the wing and more than enough room for all the electronics. I also installed a switch with a charging jack in one of the hatches for the long days at the flying field.

Lanier RC's Pro-Cub kit features the same high-quality parts that you'll find in Lanier's other kits, and it's an easy build. The Pro-Cub is even more fun at the field, where it excels at aerobatics. Remember, this one is for experienced pilots only; it sure isn't an "ordinary Cub."

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

The fuselage is made of two center laser-cut balsa core pieces with plywood sides.



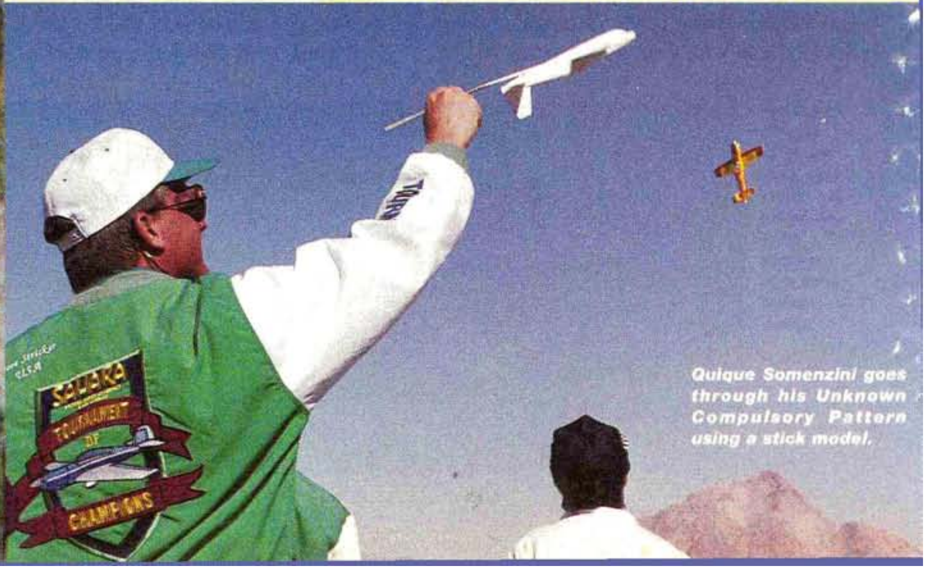
by ALAN McSWAIN

14th Annual Tournament of Champions

Ivan Kristensen's smoke pump at full blast during his freestyle program.

IF HIGH-PERFORMANCE model aerobatics competition were as popular in this country as say, heavyweight professional boxing, then every pattern contest in America would resemble the startlingly unique Sahara Hotel and Casino's 14th Annual Tournament of Champions held last October 22 to 26 in wide open Las Vegas, NV. Purely invitational, the TOC briefly brings together 20 of the planet's best model airplane pilots and tests their flying skills, stamina and the technologies woven into their flying machines in a grueling four-day blizzard of airborne beauty and violence, both indifferently regulated by the laws of physics.

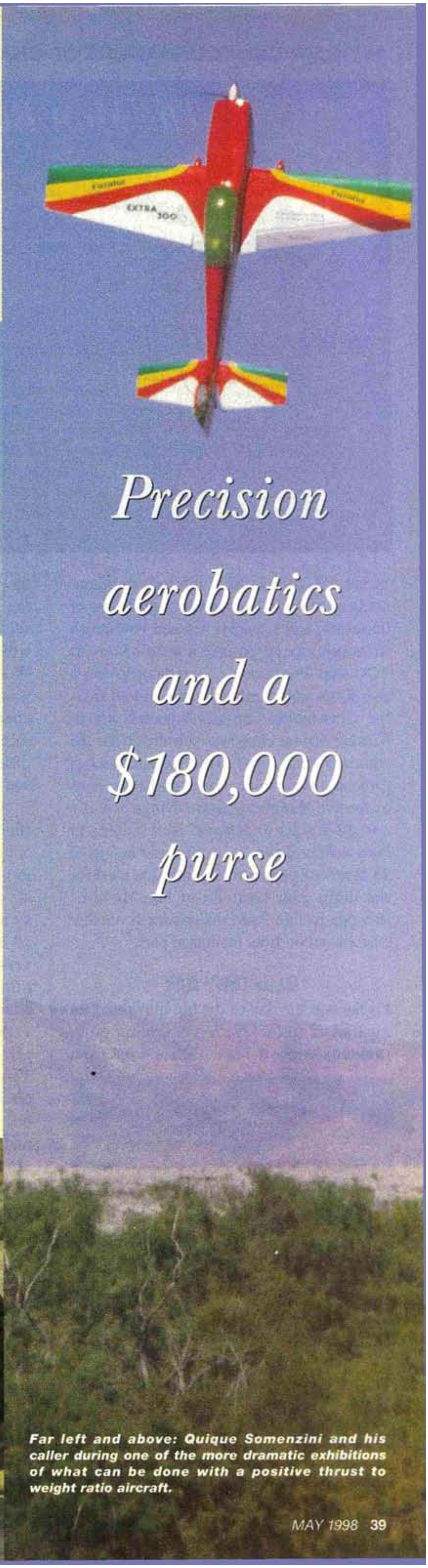
PHOTOS BY ALAN McSWAIN



Quique Somenzini goes through his Unknown Compulsory Pattern using a stick model.

Precision aerobatics and a $180,000 purse

Wolfgang Matt goes inverted during a graceful slow roll.



Far left and above: Quique Somenzini and his caller during one of the more dramatic exhibitions of what can be done with a positive thrust to weight ratio aircraft.

Right off the bat, I confess that I have never attended a TOC, much less been asked to cover such an outing for a major hobby magazine, so if you're a serious pattern guy expecting a more traditional account of how many guys use "Brand X" radio instead of "Brand Y," I'm afraid you might be disappointed with this account. On the other hand, if you're an average Joe like me who grinds a plane in pretty regularly, can't tell the difference between an expert's rendition of an avalanche and the way you normally fly and have always wondered what it would be like to hang out with 19 of the world's best R/C pilots for a few days, well, read on.

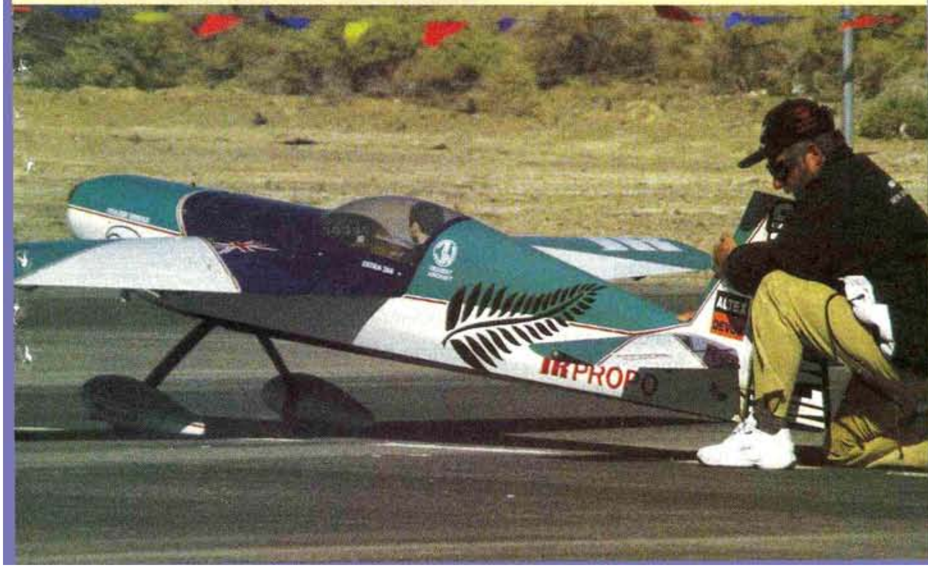
Bill Cunningham's immaculate but ill-fated 46-percent G-202 rises and accelerates toward the box.

IN THE PITS

The first thing that smacks you right in the face when you enter the pits is how darn big these planes really are—all mid-wing monoplanes with spans close to or over 10 feet. There were six Giles G-202s, five Extra 300Ss, three Extra 300Ls, two CAP 232s and one each G-200, Extra 260 and Sukoi 26m. This may sound like quite a mixed bag of aircraft, but in reality, they all pretty much look alike, with the exception of the Sukoi. I imagine this is partly due to the contest's 10-percent rule, which allows a 10-percent deviation in scale outline. With a 10-percent margin, it doesn't take much of a change to make an Extra 260 look like a G-200. The smallest wingspan and scale this year were 108 inches and 37 percent, respectively, and the biggest plane, '96 champion Steve Stricker's 44-percent-scale Extra 300S, shouldered a 129-inch span.

After walking up and down pit row a few times, I paused to admire a pair of Extra 260s in the Frazer Briggs pit, where I was fortunate to meet Mike Briggs, Frazer's

Frazer Brigg's father, Mike Briggs, holds on to his son's Extra 260s. Frazer's 260S fuselage is a Nomex honeycomb/Kevlar sandwich.



The Man Behind the Scenes

As I wandered about the TOC during my first day, I couldn't help but be impressed with how upscale the TOC was. This piqued my curiosity about the man behind the TOC, Bill Bennett.

William (Bill) Gordon Bennett, a lifelong aircraft modeler, began his climb toward success as the owner of an Arizona furniture store. Moving into casino management, Bennett quickly rose to the executive level. In 1974, he and a partner purchased the Circus Circus hotel and casino and established the TOC. During his 20 years at Circus Circus, Bennett built the world famous Excaliber and Luxor resort hotels. In 1994, he stepped down from the CEO seat at Circus Circus and, a year later, purchased the aging Sahara. With model airplanes not too far from his thoughts, Bill also recently acquired K&B Mfg.

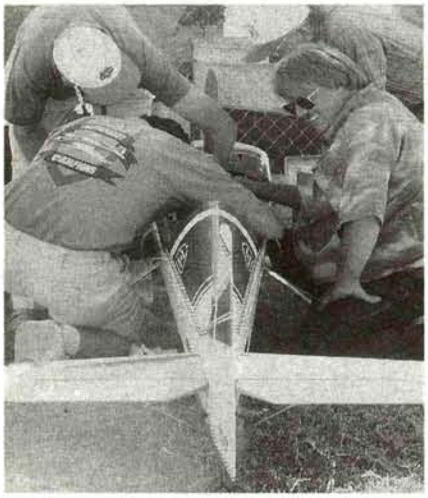
Not one to forget that his good fortune comes from the community, Bennett is a generous and frequent philanthropist, providing grants to build athletic stadiums, computer labs and other educational facilities.

In preparing this article, I was fortunate to speak candidly and at length with one of Mr. Bennett's longtime friends and flying buddies who, when asked, "Why does he do it? Why does he spend so much money promoting model aerobatics?," replied, "You know, the guy just really likes model airplanes, and he likes the kind of people who fly them, too."

father. Mike was kind enough to spend about an hour with me answering all sorts of questions, and I quickly learned how much time and money go into a state-of-the-art TOC ship. For instance, even though Mike's two Extra 260 fuselages were pulled from the same molds, one was 4 pounds lighter because Kevlar cloth was substituted for the standard glass cloth. This weight savings came at a steep price, however; Kevlar is so expensive that the weight savings actually cost $2 a gram to achieve. Also helping to keep weight down, an oven-cured lay-up of 28 layers of carbon-fiber cloth was used for the main gear (instead of machined or stamped metal). Even the spinner is another custom carbon-fiber laminated part.

BLUSTERY DAY

Friday was the day of the big blowout. The qualifying rounds were continuing quite smoothly under a 5- to 10-knot wind from the southwest. At about 11 in the morning, the wind started to gust intermittently, sometimes bordering the 20-knot point, at which time the high-wind rule kicked in. Wolfgang Matt was on the flightline and was clearly concerned about this sudden change in the wind's behavior. Having received his "Start engine" order from line official Dick Penrod, Wolfgang took off and started his pattern.



Ivan Kristensen's crew in up to their elbows during a freestyle equipment add-in.

About halfway through Wolfgang's flight, the wind actually reversed direction and doubled in intensity, making it almost impossible to maintain a straight line in the air. Matt Sr. finished his program as well as he could and landed, but he was not at all happy about how unfairly the American version of mother nature had just treated him. Flying was then stopped, and the intermission demos proceeded.

Amazingly, the wind whipping we were all getting just didn't seem to faze Tennessee's Dave Storey and his JR Ergo 60 demonstration helicopter. While numerous lawn chairs were busy heading south under their own power, Dave teased the crowd with several minutes of inverted flight a mere 8 inches above the asphalt. After the lunch break, officials decided to cancel the flying for the remainder of the day, cancel the next two rounds and allow the few pilots who didn't finish the Friday round to do so on Saturday morning.

SATURDAY SKY DANCING

The highlight of the TOC competition is always the 4-minute Freestyle, and it is very interesting to compare the techniques of the various pilots. In general, the Americans tend to fly fast, big maneuvers and don't seem too concerned about synching the action to the music. The Europeans—and especially Quique Somenzini—fly much more slowly and work hard at synchronizing their pattern to the music. Japan's Hajimi Hatta had a style that resembled the Americans' more than the Europeans', except he flew higher. Frazer Briggs of New Zealand flew with a big, fast American style, but he seemed to have no trouble synchronizing his flight to music.

Saturday's gremlins bit hard on the ankles of Bill Cunningham, whose engine cut out on the base leg of his final approach on his final flight of the day. He milked it for all he could, but the G-202 stalled and nosed in from about 20 feet up. I half expected the pieces to be returned to the pit area, but instead, they were seen being carted off to the parking lot where they disappeared.

Going on to the finals would be, in order, Christophe Paysant-Le Roux, Quique Somenzini, Steve Stricker, Roland Matt and Dave von Linsowe.

State-of-the-Art Equipment

Got several thousand bucks lying around collecting dust? Here's one suggestion for what to do with it. Try assembling a state-of-the-art TOC aircraft or, more realistically, two of them. Here's Steve Stricker's recipe for success:

Aircraft: 44% Coombs Extra 300S

Wing area: 3,061 sq. in.

Flying weight: 54 lb.

Engine: Desert Aircraft 3W-160

Propeller: Menz 30x12 2-blade

Fuel: 92-octane gasoline/Cool Power oil mixed @ 40:1

Fuel tank: 52 oz.

Smoke system: TME electric pump using Superdry oil

Radio system: Futaba 9 ZAPS transmitter and receiver

Voltage regulation: R/C America voltage regulator

Aileron servos (6): Futaba 9204

Elevator servos (4): Futaba 9204

Rudder servos (2): Futaba 3801

Throttle servo: Futaba 9101

Servo batteries: 7,000mAh Ni-Cd

Receiver batteries: Hydramax NiMH 1,200mAh

Ignition and smoke-system batteries: Hydramax NiMH 1,800mAh

Aircraft finish: Super MonoKote and K&B Epoxy

FINAL MOMENTS

Sunday blossomed into a perfect day for this sport: absolute dead calm, bathed in warm sunlight, and visibility an easy 50 miles. With no doubt, the last day of this tournament can only be termed "electric." The finals are where the pilots ask a little bit more from their aircraft than they've asked before, and with such perfect conditions, many pilots dramatically improved on their earlier performances. But not everyone had a perfect outing. A big disappointment came when Steve

Frazer Briggs' pilot (the one who really does the flying) relaxes during a break in the action.

Stricker's 4-cylinder 3W 160 cut out toward the end of his Unknown Program II flight because of a throttle-linkage problem. With such tough competition, any little gremlin can instantly mean a

Crew members strain to hold back Todd Blose's G-202.

$20,000 adjustment on your next bank deposit slip. Steve recovered gracefully, and with some help from the other pilots, added a tensioning spring to his linkage and solved the problem.

As the finals continued, I could not help but notice how much the crowd attending this TOC became increasingly wrapped up in the contest. During these final rounds, the crowd got very quiet, and everyone in the pit area stopped moving. The tension was palpable, and even the show's narrator, Bruce Underwood, started talking in hushed tones.

Sunday's big hero turned out to be Argentina's Quique Somenzini. Quique was able to dramatically improve his 4-minute freestyle performance due, in large part, to the absolute calm that prevailed. Quique's routine is based heavily on positive thrust to weight ratio maneuvers synchronized to classical music, and in the still air, he was able to pirouette his aircraft, tail straight down, with complete control. At one point, he even brought the rudder to within 6 inches of the ground, drawing a thunderous response from the crowd that did not subside until after he had landed. Quique had clearly clinched the first place trophy.

GOING HOME

I shall remember two things in particular about my first TOC; the first will be just how much fun and how easygoing everybody I met was. The pilots and their crews, even with thousands of dollars on the line, never lost sight of their senses of humor or sportsmanship. The other thing I'll remember is something Ron Stahl, Steve Stricker's team member and manager of a hobby shop, said to one of his teammates on the last day of competition, "You know, it's so wonderful to be out here at the TOC .... For a few days, you're here with the world's top 20 pilots, their crews; you're a part of it and you're treated like a hero. Tomorrow, when I go back to work, I'll just be another schmo running a hobby shop that can't keep glow plugs in stock."

WINNERS

1. Quique Somenzini
2. Chris Paysant-Le Roux
3. Roland Matt
4. Dave von Linsowe
5. Steve Stricker

QUALIFIERS

PILOT	FROM	AIRCRAFT	QUALIFIED
Quique Somenzini	Argentina	37% Extra 300l	1
Chris Paysant-Le Roux	France	37% Cap 232	2
Dave von Linsowe	Mt. Morris, MI	44% G-202	3
Steve Stricker	Baltimore, MD	44% Extra 300s	4
Roland Matt	Lichstenstein	38% Extra 300s	5
Benoit Paysant-Le Roux	France	37% Cap 232	6
Jason Shulman	Windermere, FL	37% Extra 300l	7
Mike McConville	Champaign, IL	42% G-202	8
Frazer Briggs	New Zealand	42% Extra 260s	9
Ivan Kristensen	Canada	46% G-200	10
Wolfgang Matt	Lichstenstein	38% Extra 300s	11
Kirk Gray	Florence, SC	41% G-202	12
Chris Lakin	Springfield, MO	40% Su-26m	13
Peter Goldsmith	Australia	37% Extra 300s	14
Frank Noll Jr.	Dayton, OH	41% G-202	15
Bill Cunningham	Tulsa, OK	46% G-202	16
Todd Blose	Waco, TX	42% G-202	17
Sean McMurtry	Oklahoma City, OK	37% Extra 300l	18
Hajime Hatta	Japan	37% Extra 300s	19

PURSE DISTRIBUTION

1. $40,000 **2.** $25,000 **3.** $15,000 **4.** $12,500 **5.** $10,000 **6.** $7,500 **7.** $7,000 **8.** $6,500 **9.** $6,000 **10.** $5,500 **11-20.** $4,500

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

LINCK MODELS

Chips Akro II

by Stan Kulesa

LET'S FACE IT. Someone shows up at your field with a ¼-scale Laser, and everyone stops to watch it fly. These models repeatedly catch our attention because they are the "poster children" of raw power, good looks and extraordinary aerobatic performance.

Unfortunately, there are few .40-size "Laser-like" models available. While I was making the rounds through the exhibitors' booths at the WRAM Show in White Plains, NY, this past year, the Linck Models* display caught my attention. Along with their popular Doubler

An aerobatic thoroughbred

model, Linck has recently released the Chips Akro II, marketed as "a true aerobatic thoroughbred." Since I'm one of those people who enviously watch the ¼-scale Lasers when they perform at my field, the Linck Models Chips Akro II piqued my interest right away.

I spent some time speaking with Steve Teerlinck, the owner of Linck Models, and he explained that they focus on light but sturdy construction; plywood is used sparingly but effectively. For example, the balsa fuselage sides are reinforced with an ⅛-inch lite-ply doubler (and each of these doublers has 15 precut lightening holes)—light, but strong.

THE KIT

All wood parts are machine cut, and the formers, fuselage sides, ribs, sheeting, etc., are easy to identify because they are clearly stamped and named. Spars, bracing, capstripping and leading/trailing edges are rubber-banded together. There were no cracks, warps or twists. The hardware is packaged in a clear plastic bag and contains nearly everything you'll need for final assembly. Landing gear is two pieces of $\frac{5}{32}$-inch piano wire. The two rolled sheets of blueprints are well drawn and easy to follow. The instruction manual is very detailed and takes the builder step by step through the construction process. The quality of the pictures in the manual was only fair (they look as if they've been photocopied), but they are discernible and useful.

The construction of the Chips Akro II is fairly straightforward and requires the moderate building skill typical of most models. Because the parts are machine cut, there is consistency in size and shape, and that helps everything to fit together easily. Linck Models specifies recommended types of adhesives throughout construction.

PHOTOS BY STAN KULESA & GERRY YARRISH

SPECIFICATIONS

Model name: Chips Akro II

Manufacturer: Linck Models

Type: sport/aerobatic

Wingspan: 56 in.

Airfoil: semisymmetrical

Weight: 5.25 lb.

Wing area: 525 sq. in.

Wing loading: 23 oz./sq. ft.

Channels req'd: 4 (aileron, rudder, elevator and throttle)

Engine req'd: .40 2-stroke or .45 to .50 4-stroke

Engine used: O. S. Max FS 52S

List price: $109.95

Features: precut machined balsa and lite-ply parts; two sheets of full-size rolled plans; built-up balsa and lite-ply construction; built-up balsa wheel pants and cowl; hardware package, including clevises, threaded rods, bellcranks, ball-link aileron connection, hinges, etc.; glass-filled motor mount; prebent wire landing gear; clear plastic canopy.

Comments: this is one interesting model to build. Fuselage construction starts off very boxy, but rounded corners, cowl cheeks and wheel pants give the model a very sleek appearance. You will want to dress up this model with vinyl graphics. Complementing the Akro's great looks is its outstanding flight performance. Aerobatics were crisp and deliberate. Both high- and low-speed performance were exceptional.

Hits
- Very complete set of excellent quality hardware.
- Clear and easy to follow, step-by-step instructions.
- Good quality balsa and lite-ply.
- All parts come pre-cut.

Misses
- Limited fuel tank capacity (see text for easy modification).

THE WING

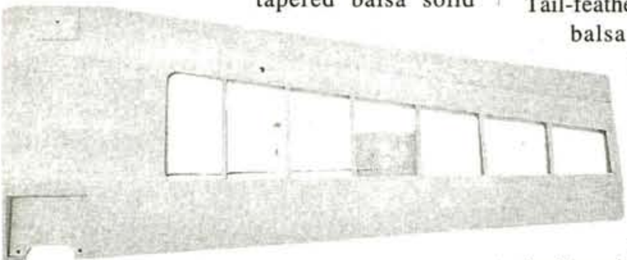
The 56-inch wing is built in one piece, upside-down over the blueprints. For those who have smaller building surfaces, the wing construction can be modified to allow the wing halves to be built separately and then joined later. Each of the 18 ribs is glued in place over a 3/16x3/8-inch balsa top spar. Since this is a semisymmetrical airfoil, the aft ends of the ribs need to be supported. The instruction manual directs the builder to use 1/4x1/4-inch spruce from the kit for this purpose. The location of the spruce building jig is clearly identified on the blueprints. (These lengths of spruce are later used as the elevator and rudder pushrods.) When setting the ribs in place, the builder needs to be aware that the bottom of each rib has been predrilled for the aileron pushrod. (Since the wing is built upside-down, remember that these holes face up during construction.) Trailing/leading edge 1/16-inch balsa sheeting, webbing and capstripping stiffen the construction nicely. I used Bob Smith Industries* thin CA for balsa-to-balsa joints.

When I looked over the blueprints and instruction manual before construction, I was disappointed to find a relatively small (6 ounces) tank capacity for the model. However, you can boost tank capacity to 8 ounces if you carve a 1/2-inch rectangular shape from the leading edge of the 1/8-inch plywood center-section wing plate. I used a Sullivan* 8-ounce slant type of tank. This is a pretty easy modification and will provide a few extra minutes of flight time.

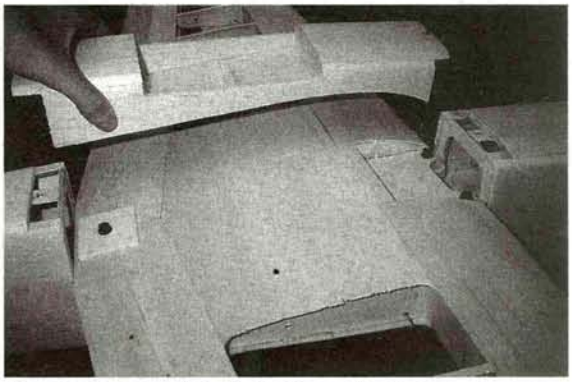
I used Great Planes* 45-minute epoxy to attach the 1/8-inch plywood dihedral brace and the center section plywood wing plate.

The center section is sheeted with 1/16-inch balsa (presumably, to keep things light). I would recommend replacing the center-section sheeting with 3/32-inch balsa because after sanding, the thicker wood is more durable and will not add significant extra weight.

Aileron construction uses 3/8x1 1/2-inch tapered balsa solid stock. The tips of the ailerons are beefed up with 1/4-inch balsa running cross-grain. The leading edge of the ailerons is rounded. I found that my Master Airscrew* razor plane made the job easy. I decided to use 6-minute epoxy and glue the horns into a notch I had cut into the aileron stock. (The instruction manual shows this as an option, and it adds to the model's clean looks.)



The wing is built in one piece, upside-down. This top view shows the bellcrank installation for the aileron connection. Because I chose to use a larger fuel tank, I needed to carve the LE of the 1/8-inch plywood wing plate. This easy modification will give me a few more minutes of flight time.



The wing is secured to the fuselage with three nylon screws. The cockpit hatch assembly is then attached to the fuselage using two flat-head screws. Construction of this hatch is much easier than it looks. Because I used a larger fuel tank than specified in the instruction manual, I needed to notch the balsa former.

THE EMPENNAGE AND FUSELAGE

Tail-feather construction uses balsa diagonal cross-bracing and gussets with 1/4-inch square spruce in high-stress areas; this keeps it light without sacrificing strength. The instruction manual had some nice cross-section diagrams showing the rounded leading edge of the fin and stabilizer and the tapered contour of the elevator and rudder. Holes for hinges (provided in the kit) are cut and hinges are dry-fit at this time.

The fuselage is built using a box-type construction dressed up with a large "greenhouse" canopy and cheek cowls.

Precut 3/32-inch balsa fuselage halves are glued together to form each side. Eighth-inch lite-ply doublers (with 15 lightening holes each) add strength but not much extra weight. These precut lite-ply doublers are also notched to fit the lite-ply formers. Balsa triangle stock is glued to the top and bottom of the fuselage sides. This triangle stock is necessary because the fuselage top and bottom are rounded later during the finishing stages.

FLIGHT PERFORMANCE

by Rick Bell

Flight tests were completed on a "balmy" November day. Temperatures were around 43 degrees, with a crosswind of 6 to 10mph. After some minor engine adjustments, we were ready to go.

• *Takeoff and landing*

The Chips is very well mannered during taxiing maneuvers. No nose-over tendencies were noted. As with any tail-dragger, advance the throttle slowly and use rudder as necessary to keep the plane pointed down the centerline. The tail comes up quickly, or you can use elevator to keep the tail down. Either way, the Chips will take off by itself. Once it's airborne, be sure to get off the elevator to prevent stalls. When at altitude and at speed, only two clicks of up-elevator were needed for straight and level flight. Landings were a pleasant surprise; I just lined it up on final using throttle to control the descent rate. Once over the numbers, cut throttle to low idle, flare, and the Chips settles into graceful two-wheel landings or very soft three-wheel touchdowns. Either way is very easy.

• *Low-speed performance*

The Chips is also well mannered at low speeds. To get the plane to stall, elevator was added and added and added until the plane was at a very high angle of attack just before mushing forward with a slight break. For recovery, just add power. Control response is also good during low speeds; no surprises here.

• *High-speed performance*

The Chips grooves very well at high speeds. No pitch trim was needed from low to high speed. Control response was very good; however, I felt the recommended high rate was a little too much, while the low rate was not quite enough. I noted that the plane would not snap during hard elevator pulls, and I didn't observe any instabilities during maneuvers.

• *Aerobatics*

The Chips Akro II comes from a long line of pedigreed aircraft, so its aerobatics performance was not disappointing. Rolls are axial and on line. Loops are as large or as small as you please, the model snaps quite well, and knifes are horizon to horizon with very little coupling. The Chips also flies well inverted with little elevator input. The Chips Akro II would make a great entry for MINIMAC events or is a fun, Sunday flyer. Enjoy!

LINCK MODELS CHIPS AKRO II

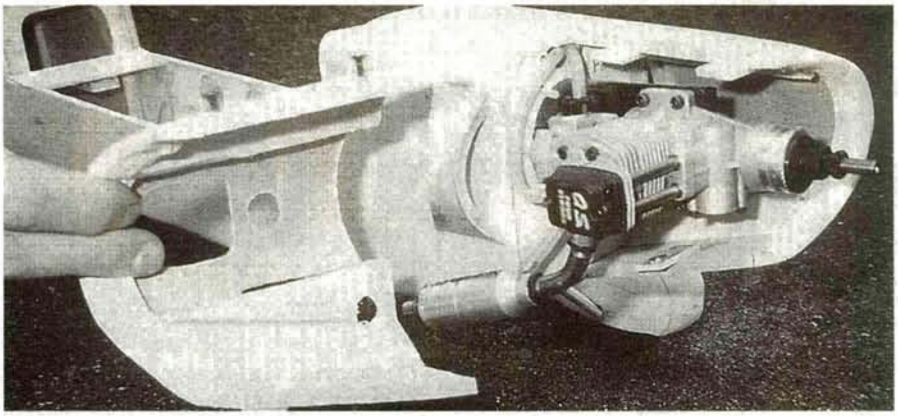
I used Bob Smith thin CA for balsa-to-balsa joints and thick CA for balsa-to-plywood joints. I used Great Planes 45-minute epoxy to attach the firewall and landing-gear mount assembly.

The kit comes with a Kraft-Hayes glass-filled engine mount. I used an O.S.* Max .52 4-stroke for power and tapped the mount before installing it. The fuselage is turned upside-down over the blueprint top view for alignment when the formers are added. I used my Great Planes builder's triangle set to keep things square. The bottom of the fuselage is cross-grain sheeted with 3/32-inch balsa, and the top is sheeted with a precut 1/4-inch balsa piece.

The cockpit hatch assembly looks complicated but isn't. Several formers and triangle stock are added to build up the structure. The 1/4-inch balsa sheeting is cut with an X-Acto* saw blade and carefully glued in place. (Wax paper between the fuselage and hatch formers helps prevent them from sticking together.)

The instruction manual suggests that you glue the tail feathers in place at this point in the construction. I chose to wait for final assembly before gluing them on because I find that method easier and because it's a pain in the neck to try to sand and cover around tail feathers that are already affixed.

The boxy shape of the model goes through a metamorphosis when the cheek cowls are added and the fuselage top and bottom edges are rounded. Preshaped 1/16-inch birch-ply cowl flanges covered with 1/64-inch birch plywood cowl skins give the nose of the fuselage a rounded contour. I used a coping saw and an X-Acto saw to carefully remove the right half of the nose section. Plywood 1/8x5/8x1 1/8-inch cowl ties and 4-40 blind nut assemblies are added so the cowl can be reattached. This provides easy access to the engine compartment once holes are carved to fit the engine cylinder head and muffler. I used my Dremel* motor tool with a routing bit to make the holes just right. After I covered the fuselage, I fuelproofed the inside of the engine compartment with Great Planes 45-minute epoxy. As with the cockpit hatch assembly, the cowl work sounds complicated, but it isn't.


The removable nose section gives easy access to the engine while preserving the model's good looks. The three holes on the nose section access panel are for fitting the cylinder head, for glow-plug access and for the fuel line pressure fitting to the muffler. I also grooved the bottom of the cheek cowl to fit the nose section access panel over the installed engine. I later installed a Du-Bro Kwik Fill fueling valve behind the glow-plug access.

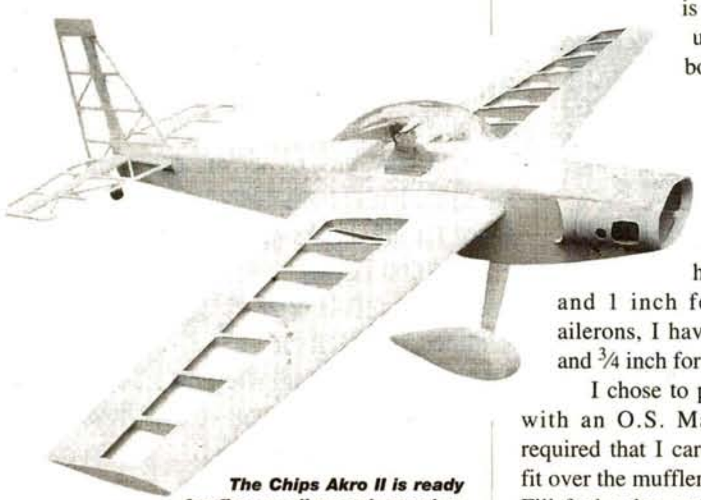
RADIO AND ENGINE

There's plenty of room in the fuselage for radio installation. The instruction manual indicates that the prototype balanced very well with the battery pack as far back in the radio compartment as it could go. My model balanced quite nicely with the servos to the rear of the radio compartment and the battery just in front of it.

The hardware needed for aileron installation (bellcranks, wire, horns, threaded wire and socket connector) is all included in the kit. I used one servo to control both ailerons.

I ended up using more aggressive throws than those recommended in the instruction manual. For the elevator, I have 3/4 inch for low rates and 1 inch for high rates; for the ailerons, I have 3/8 inch for low rates and 3/4 inch for high rates.

I chose to power the Chips Akro II with an O.S. Max .52 4-stroke. This required that I carefully notch the cowl to fit over the muffler. I used a Du-Bro* Kwik Fill fuel valve and Great Planes fuel line. The engine swings a Zinger 11x7.5 wood prop and a 2 1/4-inch black Great Planes spinner.


The Chips Akro II is ready for fine sanding and covering. The instructions called for the fin and stabilizer to be glued in place prior to covering. I chose to cover them first and then glue them in place.

FINISHING

I decided to cover the Chips Akro II with Top Flite* MonoKote. I used red for the base color and ironed on the yellow trim. I also used Great Planes 1/4-inch gold pinstriping to add definition. Finally, I used Kirby's Kustom Vinyl Graphics for the lettering and artwork. I found these graphics extremely easy to work with and quite durable. (Kirby's Kustom Vinyl Graphics has designed a set specifically for the Linck Models Chips Akro II!)

The wheel pants are built up of balsa. Because of their contour, they present an extra challenge when you cover them. Take your time, and they'll come out looking pretty good. I used Great Planes 3-inch wheels. Wheel pants aren't too friendly for those of us who fly off grass runways, but the Chips Akro II exposes a bit more of the wheel to minimize the risk.

I taped off the canopy (supplied in the kit) and sprayed it with several mist coats of aluminum paint. On top of that, I sprayed several mist coats of white to serve as a base for the next few mist coats of red. I used Top Flite LusterKote spray paints to match the MonoKote finish. A DGA Designs* 1/5-scale pilot kit dresses up the cockpit.

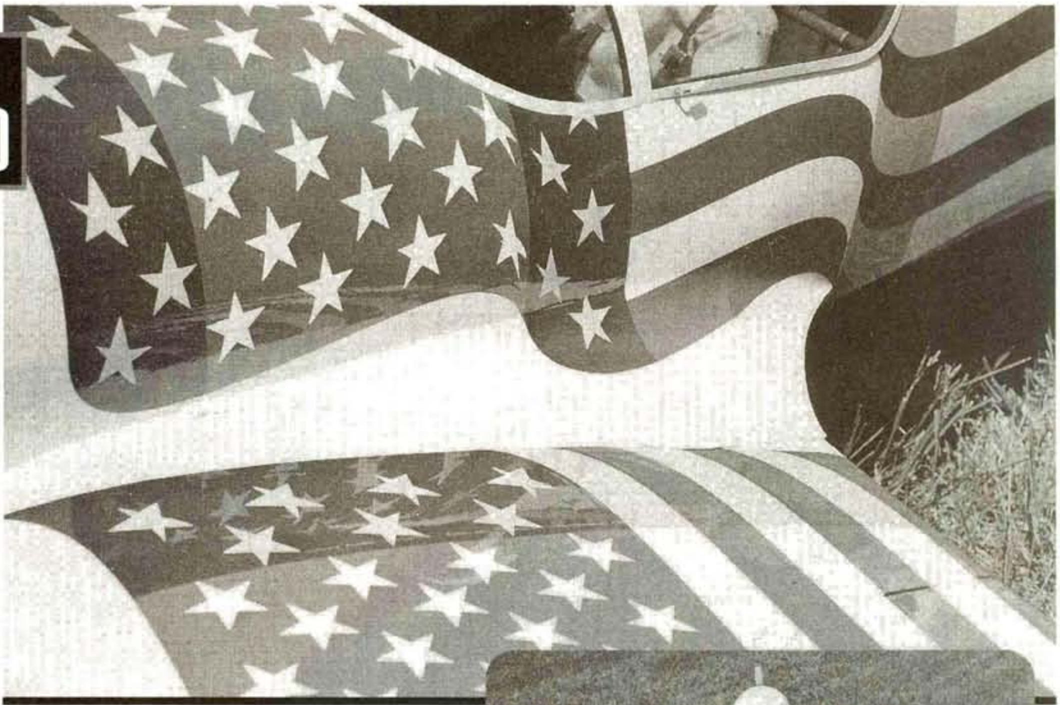
CONCLUSION

It's clear to me that a design objective for the Linck Models Chips Akro II was to keep it light without sacrificing strength. It worked. The model uses the right amount of lite-ply and hardwood in critical stress areas. Count on more than an average amount of sanding, although the job is much easier with the use of a razor plane to take down edges. I was very impressed with the quality and quantity of hardware that came with the kit. Aside from the wheels, tank, radio and engine, there's just not much left to buy. And one final comment: this is one fine-looking airplane!

**Addresses are listed alphabetically in the Index of Manufactures on page 118.*

MODEL AIRPLANE NEWS

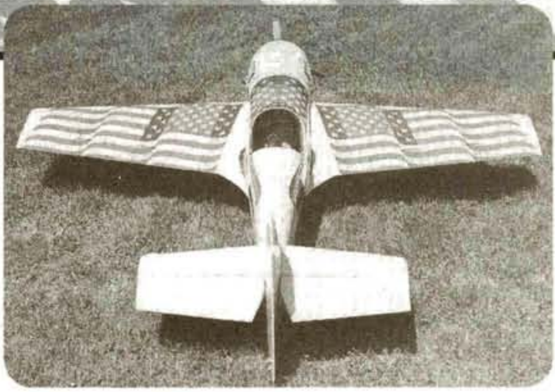
HOW TO



WING FILLETS ARE functional as well as great looking. However, they are rarely seen except on scale models. Most "sport scale" kits don't include them. Some airplanes just don't look right without them. Can you imagine a Spitfire, Zero, or Sukhoi without wing fillets? If slab-sided airplanes don't excite you, here's how to add wing fillets.

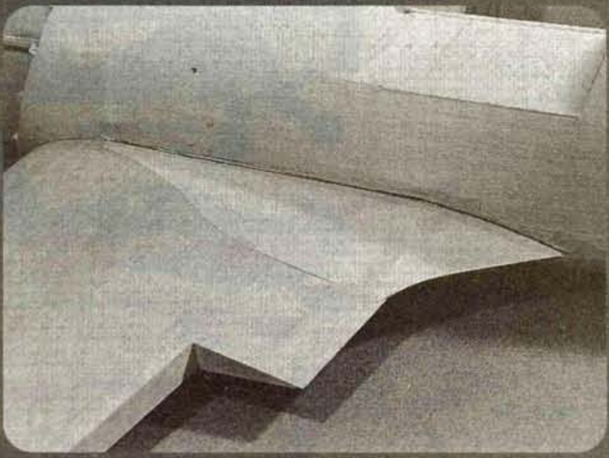
Scratch-Build Wing Fillets

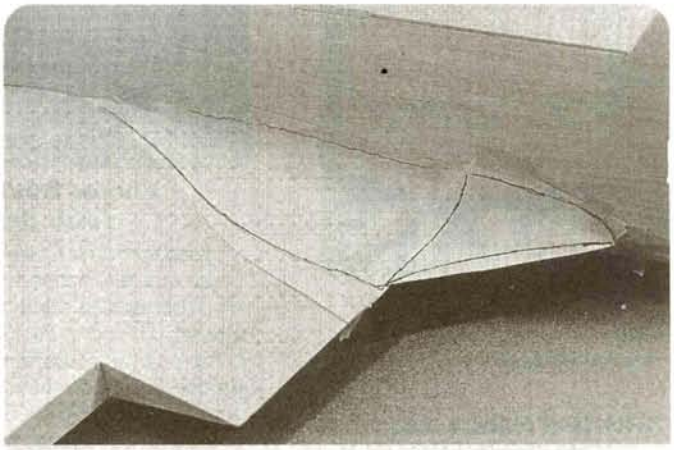
by FAYE STILLEY



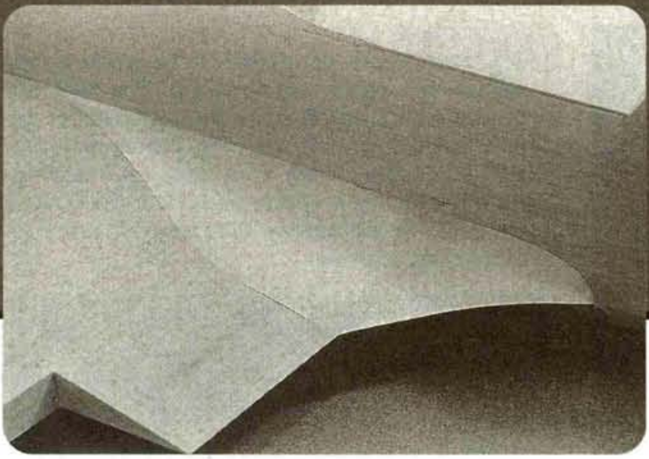
Aesthetically pleasing, aerodynamic scale realism

1 Begin by cutting a piece of heavy paper to the rough shape of the fillet, but oversize. I use bristol plate. It's a two-part paper that bends very much like thin plywood. Sometimes called bristol board, it can be found at most art supply stores. Tape the paper into place between the wing and the fuselage, forming the desired curvature of the fillet. Draw a line representing the shape of the fillet where it will connect to the fuselage.





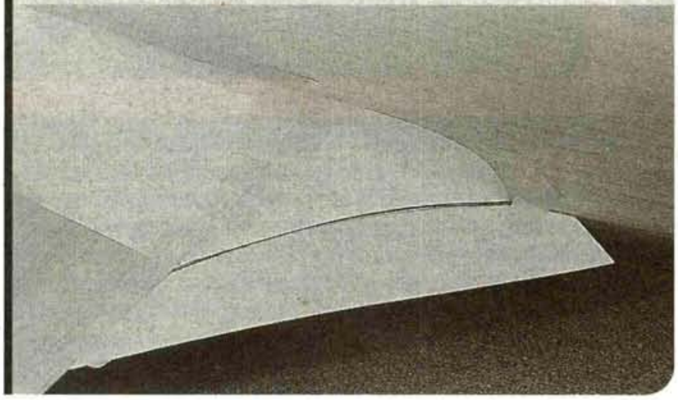
2 Plywood only bends well in one direction. The fillet extension, behind the wing, will have to be made with a separate piece of plywood. Cut another piece of the paper and fit it onto the aft part of the fillet. Bend it to form the desired curvature. Draw the shape of the fillet outline on the paper. Finally, mark the dividing line between the fillet and the extension, following the trailing edge of the wing. This is where the two pieces will be joined.

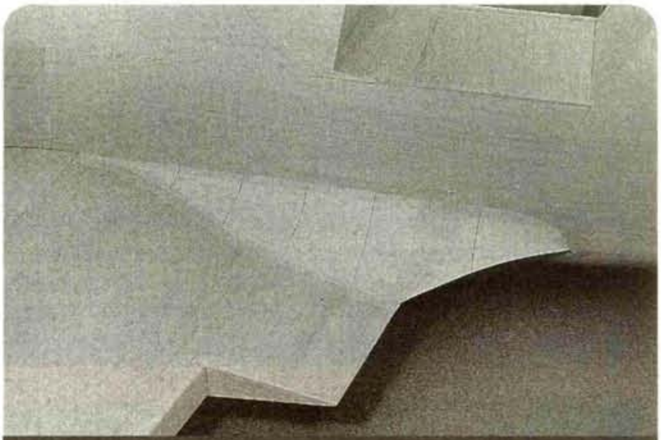


3 Remove the paper pattern, cut the pieces to shape and re-install them. Tape them together firmly and into place on the wing and fuselage. Now is the time to check alignment and fit. If any changes need to be made, do it now.

The shape of the paper fillet at this time will determine the finished shape of the fillet. Most wing fillets begin at the leading edge of the wing. The fillet that I am building here is for a Sukhoi. Its forward edge is at the high point of the airfoil. But the design and building techniques are the same for either type.

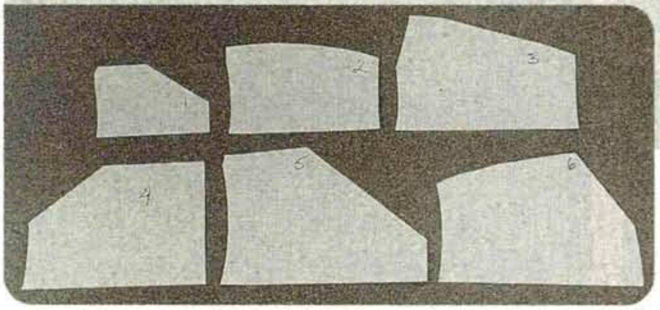
4 Cut another piece of bristol plate to fit tightly against the trailing edge of the wing and back along the fuselage, under the fillet extension. This will be the pattern for the base plate (underside) of the fillet extension. Draw the outer curvature of the extension while holding the paper firmly in place.



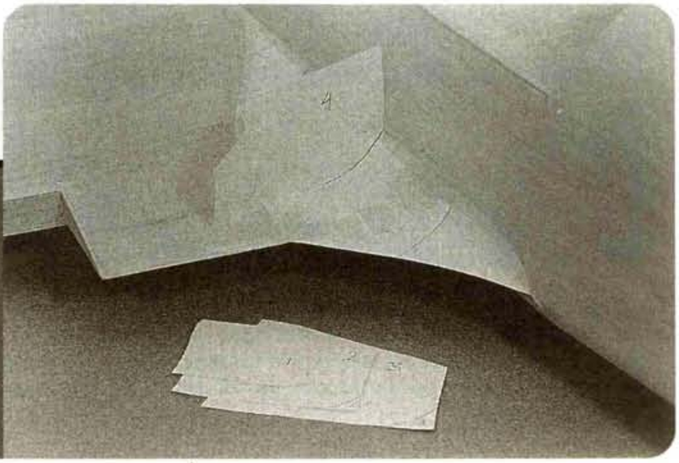


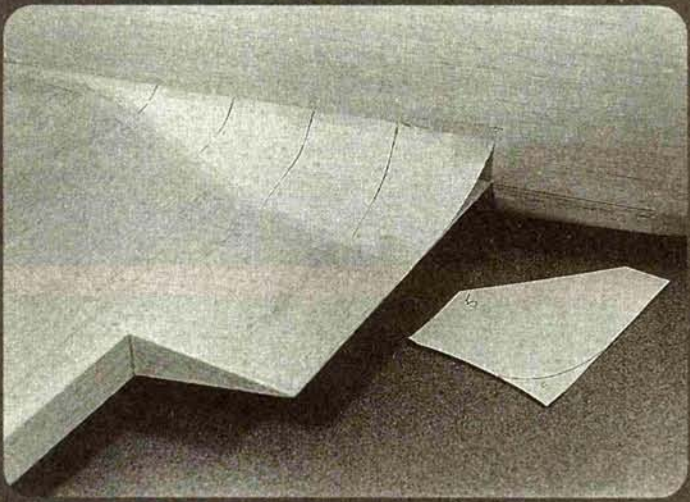
5 The plywood, which will form the upper surface of the fillet, must be supported with formers, or "ribs," if you like. Determine the desired spacing for the formers and draw reference lines on the pattern, perpendicular to the fuselage. Make the spacing equal and measure forward and rearward, using the wing trailing edge as a reference point. The number of formers isn't critical. Only enough are needed to give the plywood skin firm support.

6 Patterns for the formers are made from scrap bristol plate. Because the paper fillet is in place on one side of the fuselage, use the opposite side of the airplane to make the patterns. This particular fuselage is round, so the formers are curved (concave) where they meet the fuselage. Measure from the trailing edge of the wing and mark the reference points on the fuselage. Fit and trim the paper patterns until you have a tight fit between the fuse and the wing. Numbering the patterns can prevent errors later. The photo shows the patterns for six formers. The left sides are trimmed to fit the fuse with the bottom side sitting flat on the wing.



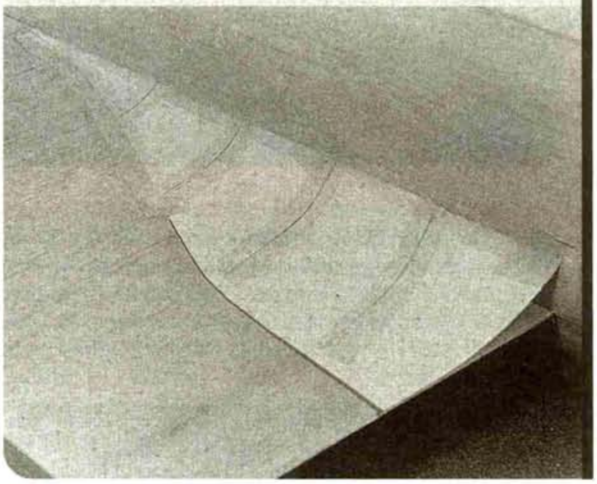
7 Return to the paper fillet that has been taped into place. Using a sharp hobby knife, cut slots in the paper from the fuse to the wing along the reference lines. Install the former patterns into their respective slots and draw the shape of the fillets' upper curvature on them. The photo shows the first three completed and the fourth inserted into the slot. Note that the lower right corner of the completed patterns show the final shape of the former.

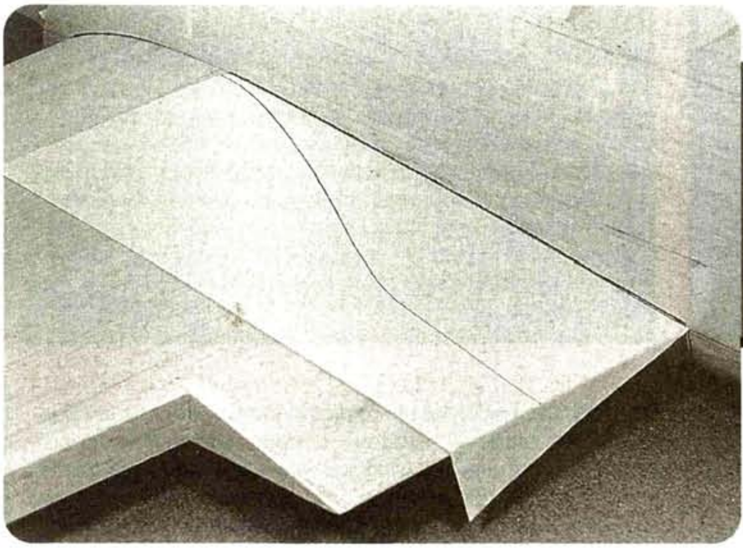




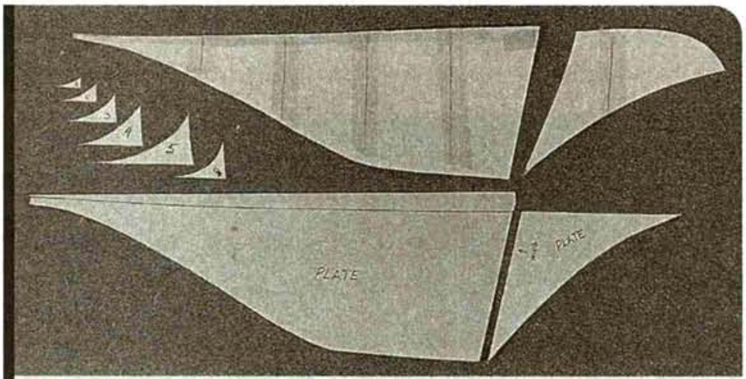
8 The trailing edge former pattern is made last. Remove the fillet extension, place the trailing edge former pattern in place and draw the fillet curvature on it. The former patterns have been completed when the paper is cut to shape.

9 There is one last pattern to be made before we can begin cutting wood. The fillet will need a base plate. It forms the underside of the fillet where it fits onto the wing. Before removing the paper fillet, draw its outline on the wing. Remove the tape slowly and draw the line as you go. This will prevent the paper pattern from slipping out of place.

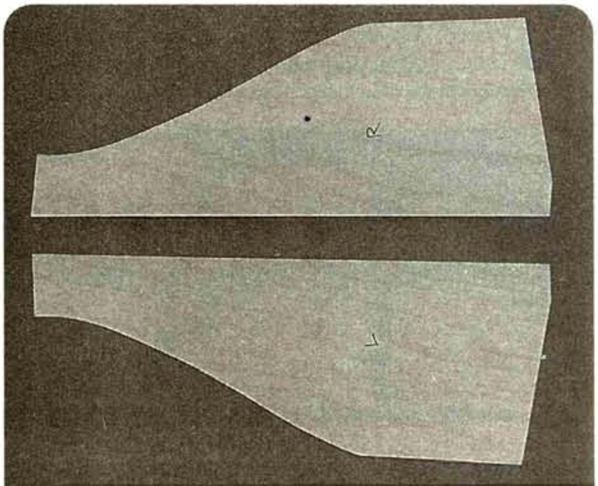




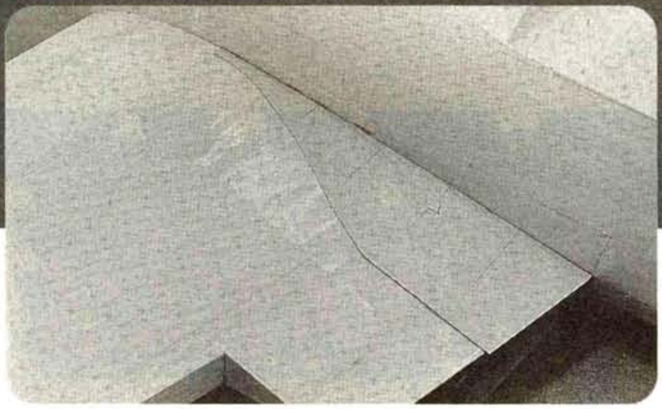
10 After the paper fillet has been removed, slide a piece of translucent paper into the wing saddle between the fuse and the wing. Draw the outline of the fillet and draw a line along the fuse and the trailing edge. This becomes the pattern for the fillet base plate. Add an appropriate amount of additional material along the fuse side to provide a good glue joint inside the fuselage.



11 Here are the final patterns. The patterns in the lower portion of the photo are for the base plates that support the fillet. The small patterns are for the formers, and the upper patterns are for the top surfaces. We will build the fillets using these patterns.

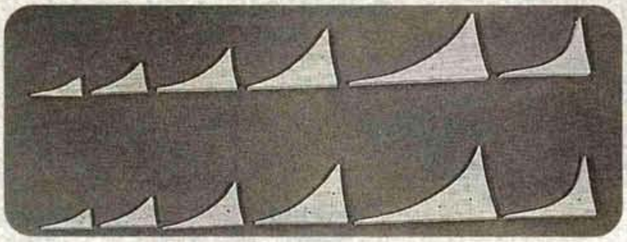


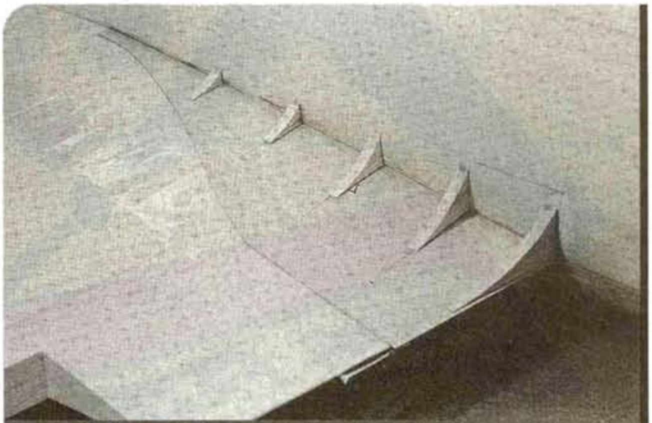
12 The base plates are cut from $^1/_{16}$-inch plywood. They are a mirror image for the left and right sides. Note that an allowance was made on the inboard sides of the base plate to fit inside the fuselage. This provides a good glue surface and forms a solid wing saddle. The plywood should be cut so that it bends easily fore and aft and provides rigidity from side to side.



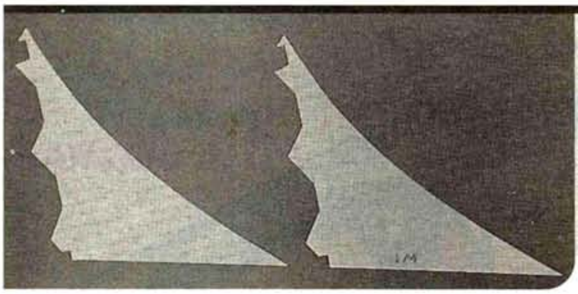
13 Reference lines for the formers are drawn on the base plate. The wing is protected with plastic food wrap, and the base plate is positioned in the fuselage. With the wing bolted in place, the base plate is glued to the fuselage along the saddle line. Use only enough glue to hold it firmly in place. The final gluing is done after the wing has been removed.

14 Two sets of formers have been prepared. In this particular case, 1/4-inch balsa sheet was used. Lighter stock can be used in smaller fillets. The small holes in the formers were made by pushpins that were used to hold two sheets together while cutting.



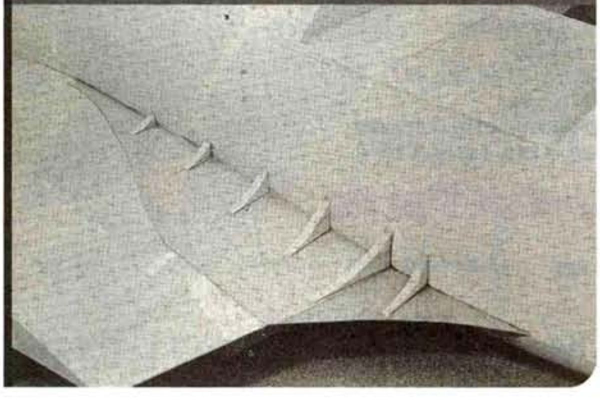


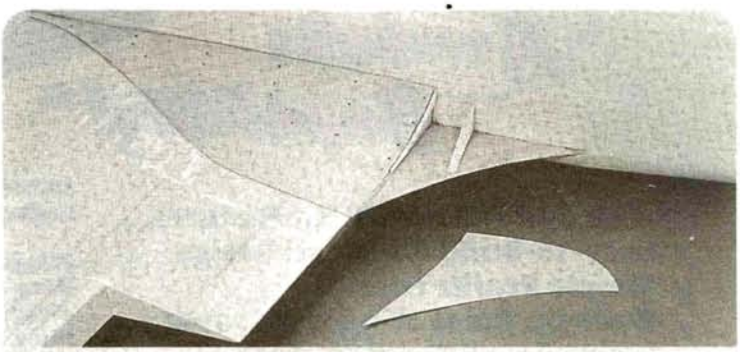
15 Here, the formers have been glued into place. Note that all are positioned perpendicular to the fuselage, except the fifth one; it follows the taper of the trailing edge of the wing. It supports the trailing edge of the main fillet as well as the leading edge of the fillet extension.



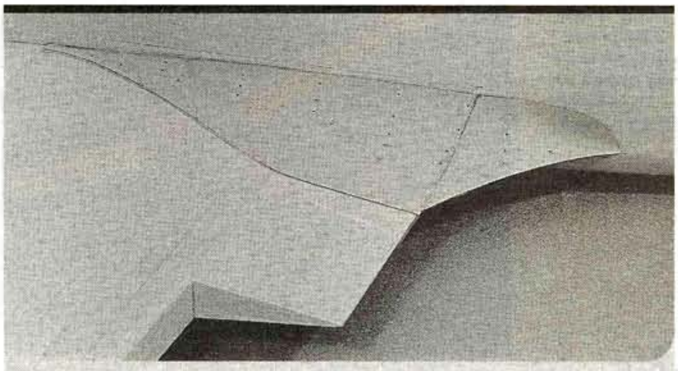
16 The base plates for the fillet extensions have been made of 1/16-inch plywood. Ordinarily, a tab running the full length of the plate would have been added. The tab would have been inserted into a slot in the fuselage sheeting. In this particular case, there were formers inside the fuse skin in the area where the plate was to be attached. Four small, pointed tabs were used (see angled tabs in photo) and glued into four slots in the fuse side.

17 Here the fillet extension plate has been installed along with the final former. The forward edge of the extension plate is mated with the trailing edge of the main plate. The aftermost point of the extension plate is positioned on the fuselage at the centerline of the wing's airfoil.



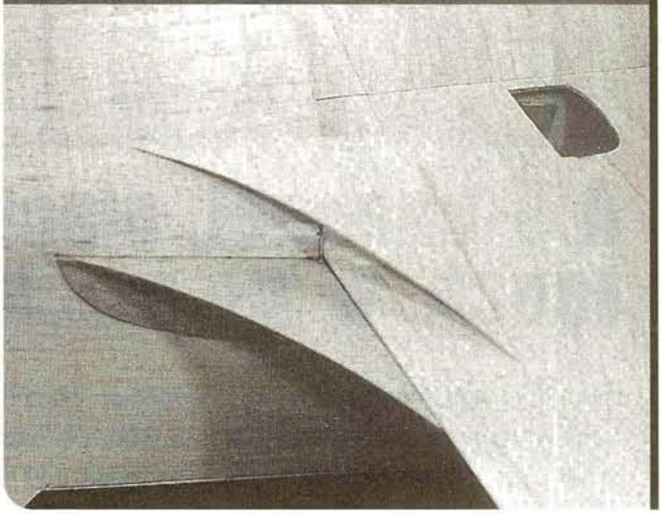


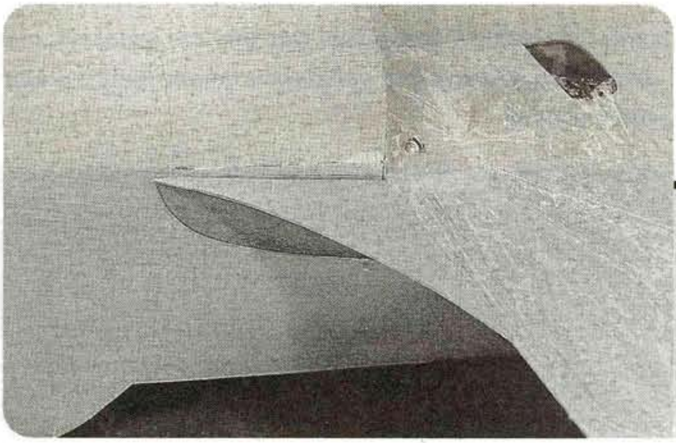
18 The top skin, 1/64-inch plywood, has been installed on the main fillet. First, line up the skin along the outboard edge of the base plate and glue in place. Then "roll" the skin toward the fuse and while holding it firmly in place, glue it to the formers by dropping thin CA through holes drilled in the skin above the formers. Finally, while holding the skin against the fuselage, run a bead of thin CA along the edge. Note that a small portion of the top surface of the trailing edge former is left exposed.



19 The skin on the extension can now be added. Line up the outboard edge and glue it in place on the plate. Pull back the skin and put glue on the trailing edge former. Roll the skin into place and drop thin CA through holes over the former. Finally, run a bead of thin CA along the upper edge where it meets the fuselage.

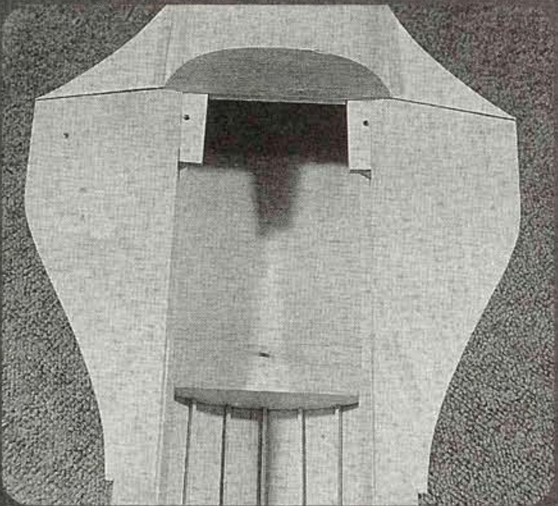
20 There is no fillet on the underside of this wing. However, the fillet extension should be built up to fit flush with the underside of the wing. Cut a piece of balsa sheet the thickness of the wing trailing edge, to fit the base plate of the extension. The pattern for the extension base plate can be used by simply eliminating the tabs.





21 Use plastic food wrap to protect the wing while gluing the balsa sheet to the plywood base plate. While holding the balsa tightly in place against the wing and fuse, glue it to the plywood plate and the side of the fuselage. If you wish to taper the balsa from the wing to the outer edge of the fillet, glue it only to the plate. After it has been shaped, glue it to the fuse.

22 Here the fillets have been finished on the underside. Note how the balsa added to the fillet extensions forms a seat for the trailing edge of the wing. Note also how the base plates of the main fillets extend into the fuse and form a solid wing saddle. The fillets are now glued to the inside of the fuselage surfaces.



23 Here is the top view of the completed fillets. The tiny holes where the thin CA was used to bond the skin to the formers have been filled. The fillets have been finish-sanded and are ready for covering or painting. The dark spots are areas where the outer ply of the 1/64-inch plywood was sanded away in the process of getting a satin-smooth finish.

MODEL AIRPLANE NEWS
CONSTRUCTION

by RANDY RANDOLPH

ECOL

A 3-channel, electric, touch 'n' go machine!

ECOL in flight. You can expect about 6 minutes of powered flight from each charge on an 800mAh battery pack.

ALMOST EVERY morning the year around, local "good old boys" gather at a junior college campus in the Dallas area to talk about and fly electric airplanes and sailplanes. Because they are such an affable bunch and they let me join them (if I listen, instead of talk!), I needed an electric airplane. The group's consensus was that the excellent, inexpensive Kyosho* AP 29 motor with an 800mAh battery pack in an airplane that weighed no more than 2 pounds would be a fun machine. ECOL was the result, and it is a fun machine!

Helen Randolph and ECOL. The bicycle and ECOL have a lot in common: neither emits exhaust fumes or noise. Helen's T-shirt commemorates her participation in RAGBRAI, a bike ride across the state of Iowa each year.

A lot of electrics bypass landing gears because of the added weight and drag, but touch-and-go's are one of the best things that R/C flying offers. ECOL and the AP 29 have that capability, along with most of the standard 3-channel maneuvers.

ECOL was to be a one-of-a-kind; there was no intention of doing it as a project for publication, so the construction photography is minimal and was intended simply to remind me of the structure in case repairs were needed at some future date. Several members of the Early Morning Flying and Lunch Society asked for plans, however, and after they had been drawn, the thought that others might be interested in ECOL led me to submit the design for publication.

WINGS

Cut the ribs out of 1/16-inch sheet balsa. They can be cut out of a printed sheet made by tracing around a card-stock template with a felt-tipped pen, or they can all be cut at the same time by stacking balsa blanks together, tracing the rib pattern on top and sawing them out with a band saw or jigsaw. If you use the printed-sheet method, stack and pin the ribs together and gang-sand them to smooth out any high or low places that might have crept in during the slicing.

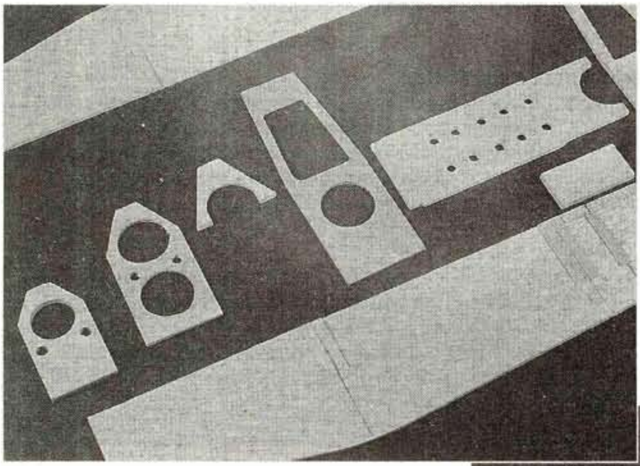
Select three ribs and trim 1/16 inch from the top and bottom of each and 1/16 inch from both sides of the spar notches. These will be the center-section ribs. Cut the webs out of 1/16-inch sheet, and pay attention to the grain. You can buy spars, but I prefer to strip them off the appropriate sheet wood. This can be done by using a straightedge and razor knife or with one of the balsa strippers on the market. The choice of wood depends on the use. Wing spars should be cut from very firm stock, while the leading edge (LE) is softer wood. The trailing edge (TE) sheet is medium-weight 1/4-grain stock. Slice the tip sections off soft 3/16-inch wood, then glue and sand them to shape. They are shown full size on the plans.

Build the wing in halves. Cover the plan with wax paper, and start building by pinning the bottom main spar in place on the plan. Slip some ribs on the spar and use them to position the TE sheet so it will match any slight difference there might be in the length of the ribs and the plan. Pin the TE in place and, starting with the trimmed center rib (which is slanted as shown on the plans), proceed to glue on ribs and webs out to the tip.

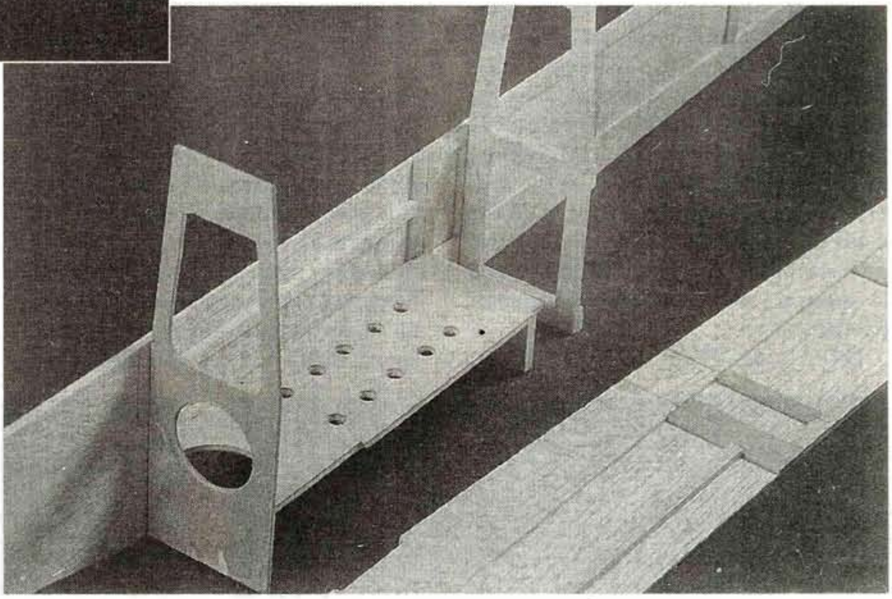
When all ribs and webs have been installed, add the top main spar and the 1/16-inch square TE strip. Make sure the spar is glued to all the webs, as well as to the ribs. The front top spar can be installed at this time, but do not add the top TE sheet just yet. It will be installed after the wings are joined at the dihedral joint. Build the other wing half in the same way.

When both halves are complete, sand the center spars and TEs to the dihedral angle and slice the dihedral braces from 1/16-inch plywood. Place one wing half flat on the bench, elevate the other 5 inches at the tip rib and install the braces on each side of the main spars. Check for fit, then glue all joints. When everything is dry, install the top TE, the bottom front spar and the LE. Then sheet the center section.

Build the rudder/fin and the stab/elevator right over the plan. Relatively soft wood



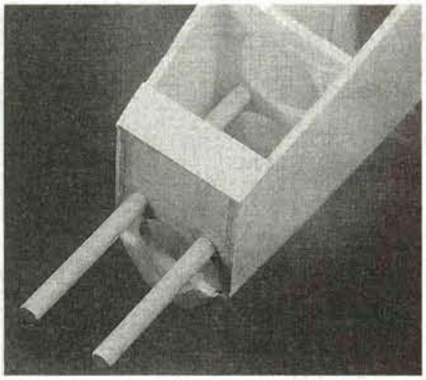
After the doublers have been added to the fuselage sides and the formers and cabin floor have been framed up, the fuselage almost builds itself.



Below: the cabin floor acts as a crutch between the two cabin formers and keeps them, and the fuselage sides, nice and square during assembly—an old kit trick that works great.

PHOTOS BY RANDY RANDOLPH

SPECIFICATIONS
Name: ECOL
Type: electric sport
Wingspan: 51 in.
Wing area: 344 sq. in.
Length: 38½ in.
Weight: 32 oz.
Radio req'd: 3-channel
Motor used: Kysoho AP 29
Plans price: $12.95
Comments:
"ECOLogically clean" is a good description of an electric-powered airplane. The ECOL (FSP05981) flies with little noise, emits no exhaust fumes and requires no cleanup after a flying session. The best part is that a small airplane like ECOL can be flown in a lot of places that are nearer to home than regular flying fields.



The two 1/4-inch-dowel motor mounts are simply slipped through the pre-drilled holes in the firewall and F3 and cemented into place. The mount is simple, light and effective.

should be used to keep the weight in this area as low as possible. Add hinges after you've covered the surfaces.

THE FUSELAGE

This is really a simple box with a cabin and turtle deck added. Cut the two sides out of 1/16-inch balsa sheet, and add the 1/16-inch balsa doublers and uprights. Make the cabin floor out of 1/16-inch balsa laminated to a piece of 1/32-inch plywood. Don't forget to drill the ventilating holes.

The cabin formers F5 and F6, with the cabin floor between them, are glued into position on one of the fuselage sides. Then the other side is glued right over the first. Be sure the two sides match exactly before you apply the glue. Bevel the inside of the fuselage sides at the tail, bring them together and glue. Add the three aft turtle-deck formers and the two 3/16-inch-square stringers. Fill in between the stringers where they meet the front of the stab mount.

Drill F2 and F3 for the 1/4-inch-dowel motor-mount bolts and vent holes. Glue them into position between the fuselage sides, and add the motor mounts and aft turtle-deck former. Glue the turtle deck side sheets into place, allowing them to extend to F5 and far enough in front of the firewall to form the cowl. Use a sanding block to sand these pieces flush with the top of the formers, trimming them to correspond with F4. Then add the top piece from F4 to the front of the cowl. Cut the two 1/8-inch wing mounts and glue them between F5 and F6; then add the vertical sheet on the right side of the cabin and the 3/8 x 1/8-inch brace on the left side. Glue F1 into position and add the bottom sheet to just aft of F2 before cutting the cowl free at F2. Add the 1/16 x 1/8-inch braces to the inside of the cowl where it contacts F2.

The windshield and aft cabin fairing

FLIGHT PERFORMANCE

ECOL is a fairly large airplane for the AP 29 motor and was built to be a solid and stable flyer with better than "satisfactory" performance. It is intended to provide good touch-and-go fun from a grass field at a minimum of expense and effort.

• Takeoff and landing

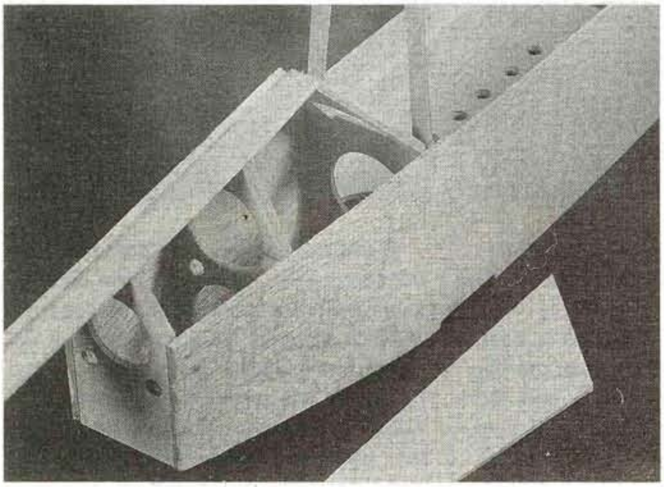
Takeoffs are attractive! That sounds like a rather surprising way to describe how an airplane takes off, but it does apply. When the power is advanced, and after a short roll, ECOL gently lifts its tail and slips into the air without much attention on the part of the pilot. Landings are also fun to watch; ECOL has a good glide, and with judicious use of power, can be made to land just about any place you want. Control is positive with very little change in response from power on to power off.

• General flight characteristics

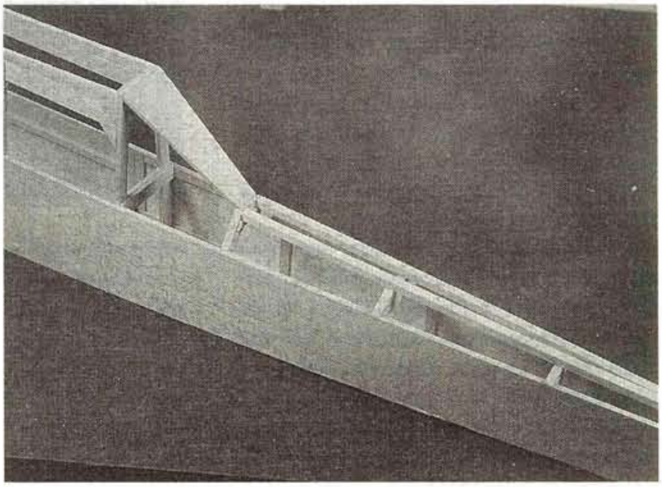
ECOL is easy to fly! With the balance point shown on the plans, it is stable and gentle. It climbs at a good angle and stalls straight ahead. Turns are smooth, and only when very tight do they require more than a touch of elevator to keep the nose up. Trim change from power to glide is minimal, but at full-power level flight, some down-trim is necessary, as would be expected.

• Aerobatics

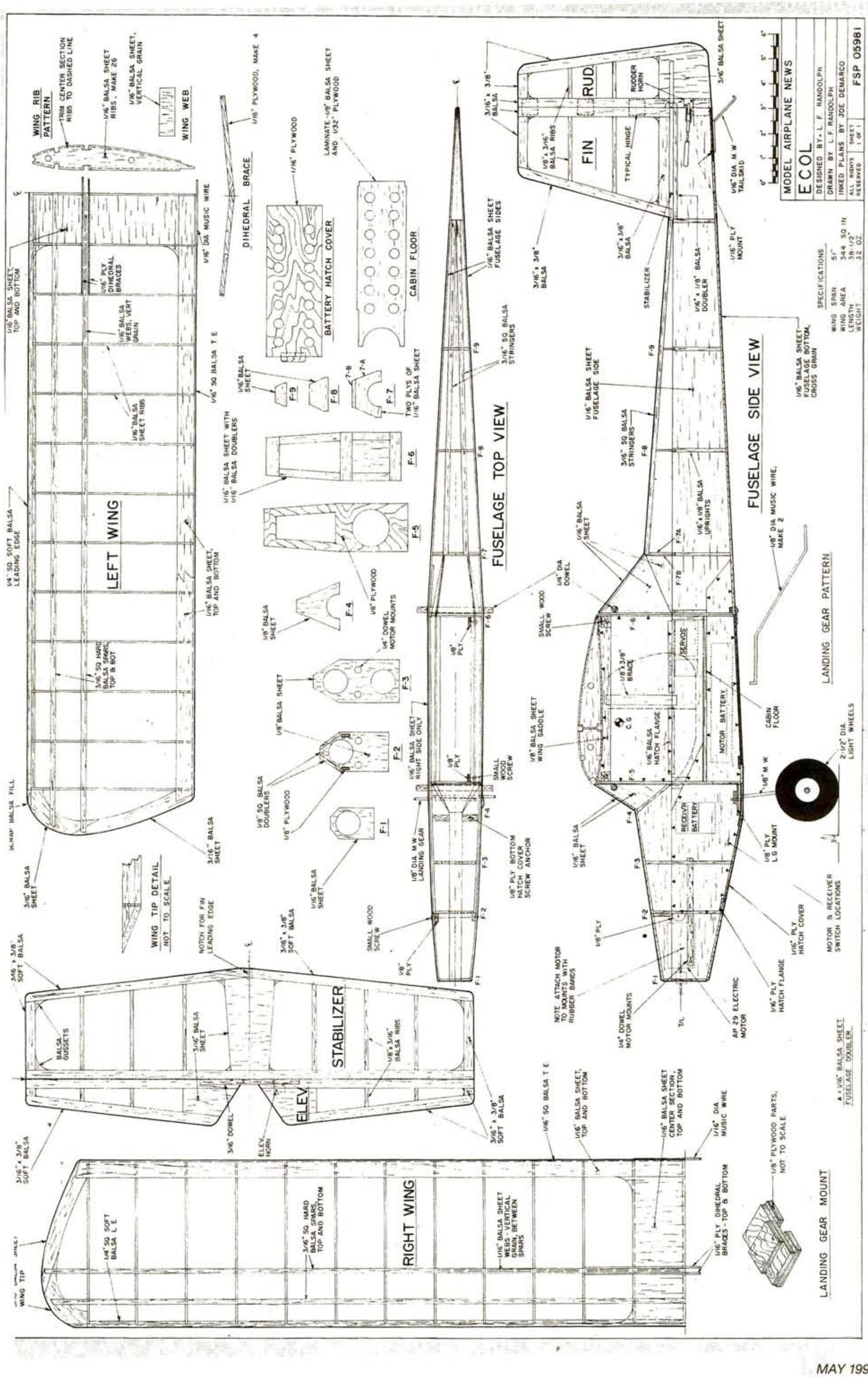
This is not an aerobatic airplane! It will loop and can be made to stall and snap, but I have never been able to get it all the way around in a roll. About halfway through, it decides that inverted is OK, so it just stays there as long as forward stick is held. A funny-looking split-S is the recovery. Knowing that, make your roll attempts at altitude! ECOL was made to do touch-and-go's, and it does them beautifully, but it just isn't an aerobat!



The 1/16-inch turtle-deck sheet is added to the top of the formers and beveled to match the former angle, and then the side pieces are added. The plans show the fuselage sides extended to F1 for much easier assembly.

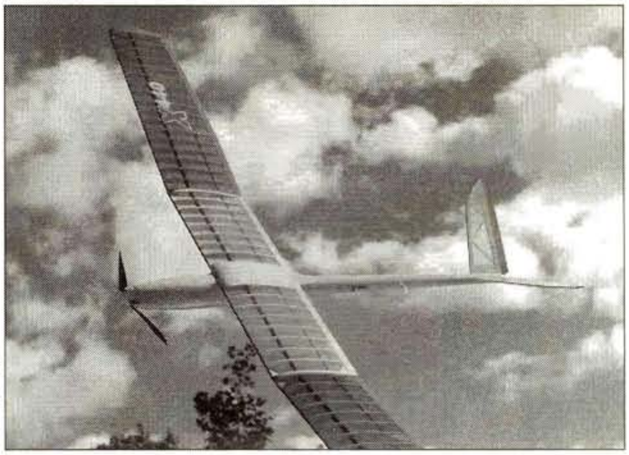


When the wing mounts are in place between the two cabin formers, the aft cabin area and the windshield are added. Both are assembled in the same manner: the center pieces are followed by the sides. Two 3/16-inch stringers complete the aft turtle deck.



To order the full-size plans (FSP05981), see page 103.

SR X440



Well, it's been about a year since we introduced our X440 electric sailplane. And, boy it's been some year! To all of you who had to wait for an X440 we have to apologize. Our production just couldn't keep up with the demand no matter how hard we tried.

We know the wait was worth it because so many of you have written to tell us how much you liked your new X440. Mike McG. wrote,"The X440 you sent me has been a pure joy! While the climb out is no where as dramatic as my Class A/B sailplanes, its low wing loading and thermal capability more than make up the difference!" Mike bought the *Standard Power System* for his X440 so his climb rate was more gentile.

Jerry H. wrote, "The quality of the model is simply amazing. I just cannot get over how nice it is. The covering job is unbelievable. The instructions are also top notch."

Here's what Chris M. had to say, "Just wanted to say how pleased I was with the X440 that you sent to Winnipeg for me this summer. I put it together on my brother-in-law's dining room table on the Sunday afternoon after I got there and went out flying the next morning. Everything worked just as it should. What a treat.

My first flight was 35 minutes with the help of a couple of thermals.. It exceeded my expectations in every way!"

Just in case you're not familiar with the X440, it's a *Custom Built* electric sailplane. It will take you about 2 hours from the time you open the box until you head for the field.

Sure there are other Ready-To-Fly and ARF kits but for the most part they are lead sled plastic bags and they still take a bunch of hours to get flying. The X440 is made up of CNC computer cut balsa and carbon fiber parts and a fiberglass fuselage. The X440 only weighs 10 ounces and once you've installed the radio system and power system the total weight is about 22 ounces for a wing loading of only 7.5 *ounces per square foot*! It has a 64.5" wing span and a wing area of 440 square inches. The aspect ratio is 9.4:1 and the airfoil is the S3021.

Power for the X440 is either a simple geared Speed 400, AP29BB, or Astro 020 Brushless motor powered by 7 of our 500 Max Series cells. As you can see from the chart below, The *Standard Power System*, which uses a Speed 400 6V motor, will give you 5 climbs to altitude from a single charge. It doesn't get much better than that!

As I've said, this is a *Custom Built* kit. By that I mean that everything is pre-built and all you have to do is mount the motor with two screws, mount the servos, and hinge and connect the control surfaces. That's it! It's as if the world's best builder custom built the X440 for you. Frankly, you've never seen an aircraft which has been built and covered as well as the X440!

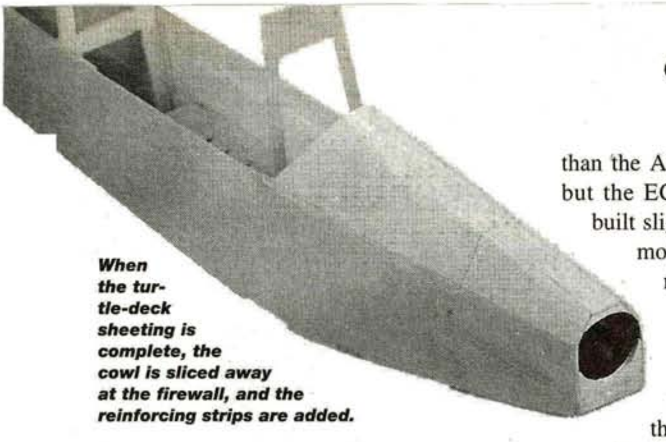
Because the parts are CNC machined, they are all identical. This not only means that the parts fit right but it also means that we can stock spare parts so that if the unthinkable should happen, we can get you back in the air in a hurry.

How does the X440 fly? As good as you could want with absolutely no bad habits. You can thermal or motor around to your heart's delight. Even with its outstanding performance, it's an easy airplane to fly and would be the ideal aircraft to use to introduce a newcomer to our Hobby. The price? Only $229.95 plus shipping but if you buy an X440 along with a *Power System* at the same time, we take $20 off of the price of the X440.

Here's an important point. To provide you with the utmost in performance and the fastest building time, we've designed complete radio and propulsion packages for the X440. We've thought out all of the details ahead of time so you won't have to waste time making all the decisions usually associated with building a new aircraft. Call us if you have any questions or to place an order. You can reach us at SR Batteries, Inc., Box 287, Bellport, New York 11713. Our phone is 516-286-0079 and our fax is 516-286-0901. Our Email address is 74167.751@compuserve.com .

If you'd like to be flying one of the world's finest electric aircraft, give us a call and we'll get one ready for you.

Power System	Motor	# Cells	Total Wt.	Amps	Climbs/Charge	Wing Loading	Climb Rate	Flight Duration
Standard-7	Speed 400 6V	7	22oz.	9.5 A	5	7.2oz	650	36 min
Standard-8	Speed 400 6V	8	23	11.5	4	7.5	860	37.5 min
Performance-7	AP29BB	7	24	16.7	2.5	7.8	1150	33.2
Performance-8	AP29BB	8	24.5	20.00	2	8	1500	35.2



When the turtle-deck sheeting is complete, the cowl is sliced away at the firewall, and the reinforcing strips are added.

are formed of 1/16-inch sheet balsa. Both areas are constructed in the same manner. Cut a wedge-shaped piece of sheet to fit from the top of F4 to the top of F5 and the top of F6 to the top of F7. Trim the triangular side pieces to fit and glue them between F4 and F5 and F6 and F7. Pay attention to the grain.

Build up and glue the landing-gear mount just in front of F5. The fuselage sides should be relieved about 1/16 inch in this area to allow the mount to blend in with the 1/16-inch sheet that will be added later. Install the rudder and elevator Nyrod guides. Add the bottom 1/16-inch plywood for the tail skid, and sheet the rest of the bottom from F6 aft with cross-grain 1/16-inch balsa. Glue in the small pieces of 1/8-inch ply that back up the screws that hold the cowl, battery hatch retainer, front bottom hatch and the side hatch in the locations shown. Cut out and complete the three hatch covers from 1/16-inch plywood, temporarily mounting them with small wood screws before sanding the finished fuselage.

The prototype was covered with Oracover* on the fuselage and MonoKote* on the wings and stab. The hinges were of the same material. It is easier to cut the vent holes in the battery hatch after it has been covered

Bend the landing gear out of 1/8-inch music wire. Add the wheels and mount with gear clips and wood screws. Bend the tail skid to shape using 1/16-inch music wire and epoxy it into its mount.

The servos and radio battery can be moved forward and aft to establish the balance point shown before they are permanently mounted. The throttle is simply a servo-actuated switch wired in series with the external motor switch. It can be mounted at any convenient location in the cabin.

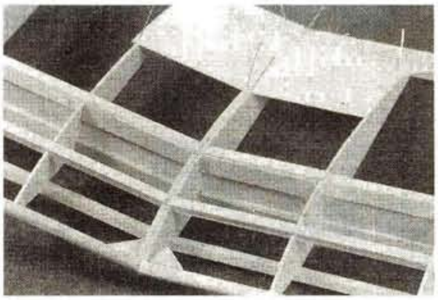
The motor is held in the motor mount with rubber bands. If the motor is new, it should be broken in according to the manufacturer's instructions before it's installed in the airplane. Motors larger than the AP 29 can be handled with ease, but the ECOL's nose and cowl must be built slightly wider to accommodate the motor's larger diameter. The motor mount need not be changed.

AT THE FIELD

First, check for warps and then be sure that the movements of the control surfaces correspond to the movements of the stick. This is the time to correct any problems.

Propellers make a great difference to the performance of electric airplanes. The Cox* gray 6x3 and the APC* 5.7x3 are good choices for this airplane/motor combination.

You should hand-launch the ECOL on its first flight. Hold the airplane level and horizontal and throw it into the wind just as you would a baseball. Allow it to gain speed before starting a gentle climb. Unless there are some bad warps in the wing, only slight trim changes should be needed to establish level flight. Climb to 100 feet or so before trying some power-on and power-off stalls to get the feel of things. Then do some touch-and-go's, or whatever your heart desires.

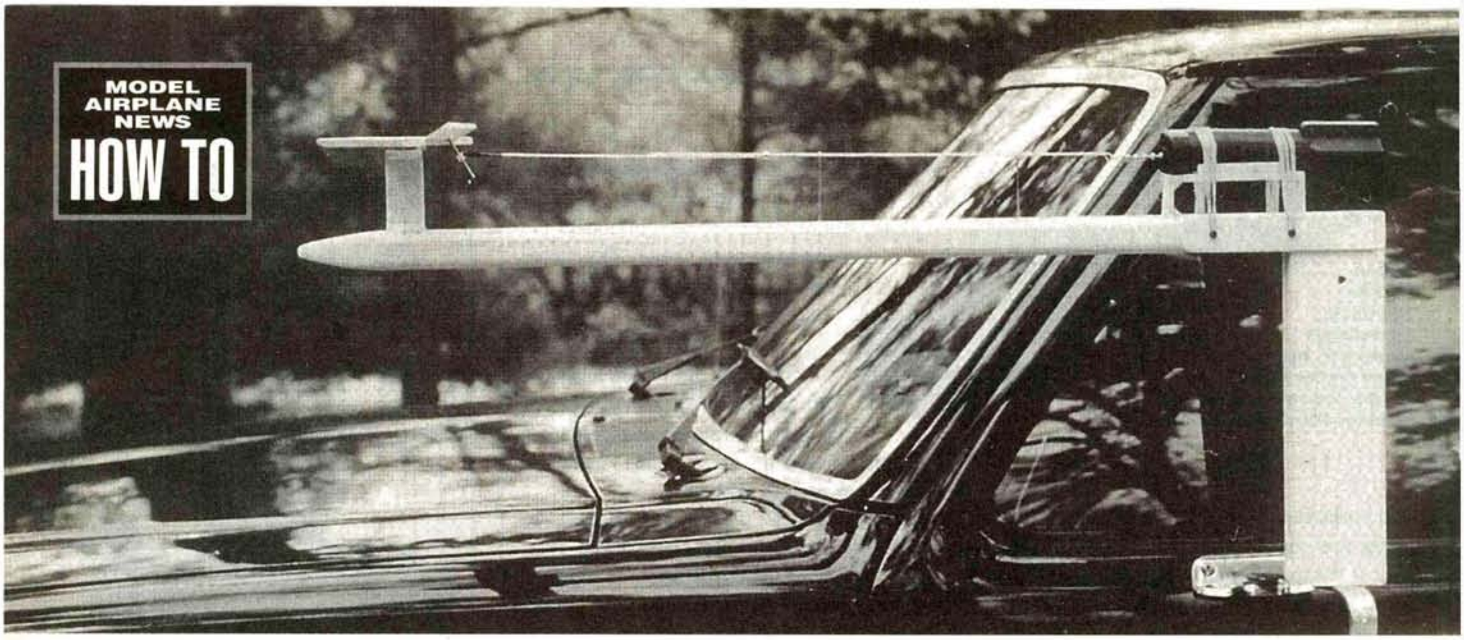


The wing halves are joined with 1/16-inch plywood dihedral braces before the center sheet is added. The center ribs are trimmed to accept the sheet, which lies flush with the top of the spars.

Since there is no tailwheel, taxiing must be done with the stick well forward to lift the tail and lighten the load on the skid. There is plenty of rudder power in this configuration for solid control to taxi and take off.

This is an airplane you can fly while wearing a suit and tie. After a day at the field, you still smell like a person rather than a self-serve gas station, and you don't have to wash your hands, or the airplane, before you are allowed into the house.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*



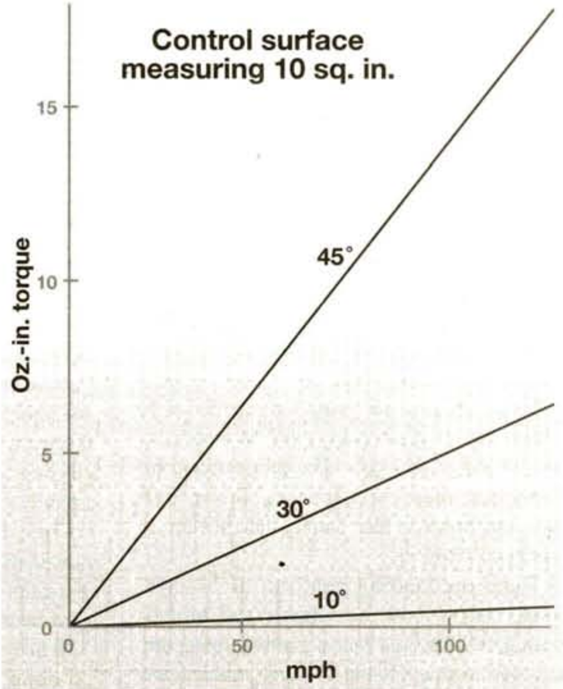
Control-Surface Loads

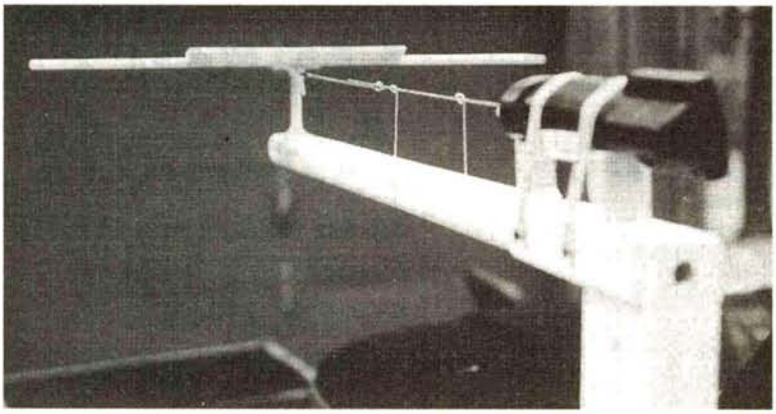
by MIKE LEASURE

Select your servos wisely

Like other advances in human history, this one started with a sharpened wooden stick. Of course, things got somewhat more complicated after that! The idea for this research came while I attempted to choose a servo size for my latest big scale airplane, the AeroPro Laser 200. Drawing on my experiences and those of other flyers, it was obvious to me that one uses heavy and expensive servos in the 100-oz.-in. range for all controls on anything 1/4 scale or larger. If it seems big, it surely must require big servos. My question is, how big is big enough and what are the *actual* loads we are talking about ?

I consulted a would-be aerodynamicist and modelers with extensive big-bird backgrounds, but no one could really tell me the actual loads that controls are exposed to in flight. They felt that the size of the surface and the speed of the aircraft were the deciding factors. This proved to be partially true and, to their credit, most had a good feel for the factors involved in force, but still no numbers.





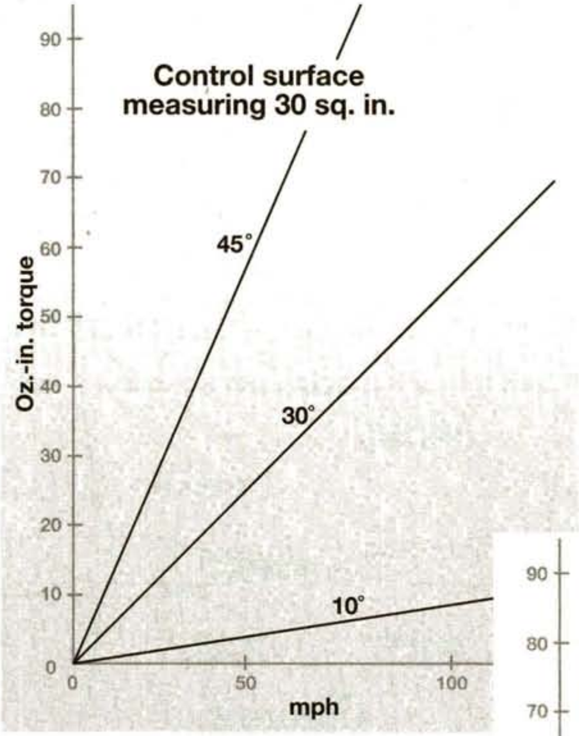
THE TEST RIG

What was needed was a test rig that closely duplicated a typical model control surface and could be used to measure torque in the typical servo rating of oz.-in. The pictured rig was built and, with no small amount of embarrassment, "flown" down a local runway. The scale is a digital fish scale that's supposed to be accurate in rough water and measures in ounces. The control arm is 1 inch from the control surface center to the center of the hole in the clevis. The rig was leveled on a 1984 Ford "wind tunnel" to ensure accurate deflection angles and to eliminate turbulence from the stabilizer mounting surface. Tape was

used to attach the various control surfaces tested, not only for its ease of use, but also because it provided a gap-free hinge line.

The test sequence involved running the rig down the runway at 20, 40, 60 and 80mph. This proved to be the limit of the Ford's performance (if anyone wants the data on the acceleration and deceleration of a 1984 Ford pickup with a 302, I can provide that also!).

The run was made twice and averaged. The deflections used were 10 degrees, 30 degrees and 45 degrees. The surface areas tested were 10, 30 and 60 square inches, with 60 square inches duplicating one half of my Laser's elevator quite nicely.



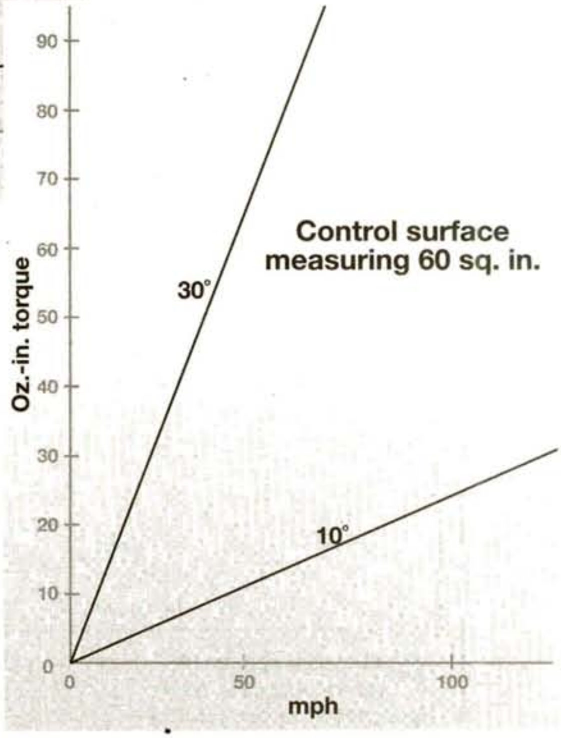
RESULTS AND EVALUATION

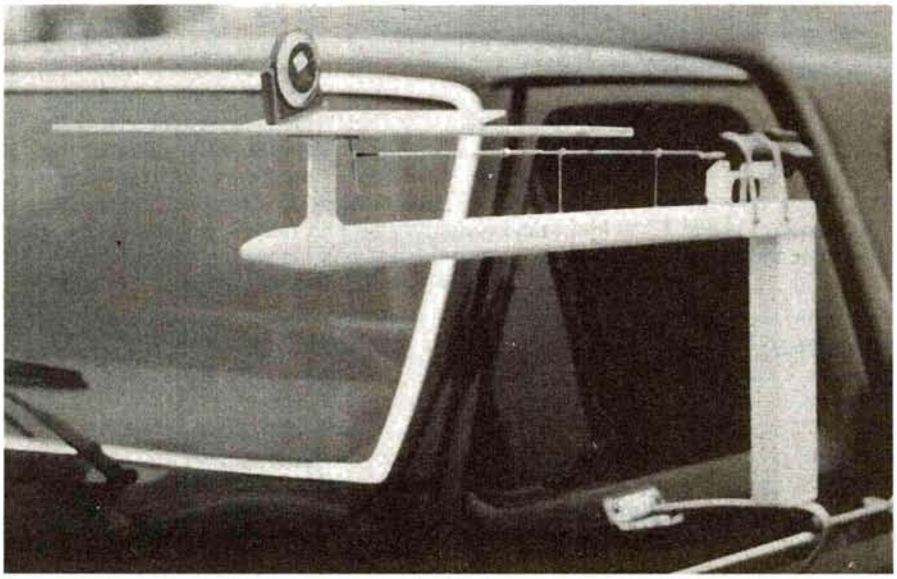
The data generated was plotted on the graphs. Lines were drawn at the angle that most accurately depicted my measured results and shown at each of the three angles of control-surface deflection. Of course, 130mph is projected out from the measured data at 80mph and below. The results are depicted in a straight line, which may not be the theoretical loads, but certainly as the loads were measured—bearing in mind the crude measurement methods.

As can be seen from the graphs, speed, area and deflection play a critical role in the loads experienced. As an example, look at the result for 100mph, 10-degree deflection and 60-square-inch surface. The measured torque is only 22 oz.-in. This load is easily handled by a standard servo. The speed could theoretically increase to 160mph before the servo would be overloaded. Look, however, at the loads for the 30-degree deflection. At 40mph, I have already begun to overload a standard servo. In my sample, a surface that measures 4x15 inches is deflected 10 degrees; this actually computes to a 0.69-inch control throw. The AeroPro plans call for 0.75-inch up and down throw on the elevator, so a standard servo could be used as long as one servo was used for each side of the elevator.

The rudder is another story. Its throws more closely duplicate that of the 30-degree deflection, and a standard servo would be very quickly overcome. I will use two servos on the rudder.

Just for fun, I found the flat plate drag for 1 square foot in an old text of mine and used this to calculate the values that an aerodynamicist would project. What I found was that the same 60-square-inch surface, deflected 0.69 inch (10 degrees) and traveling 100mph, *theoretically* developed 29.19 ounces of drag. Stick this on a 1-inch arm, and we have 29.19 oz.-in. of force!



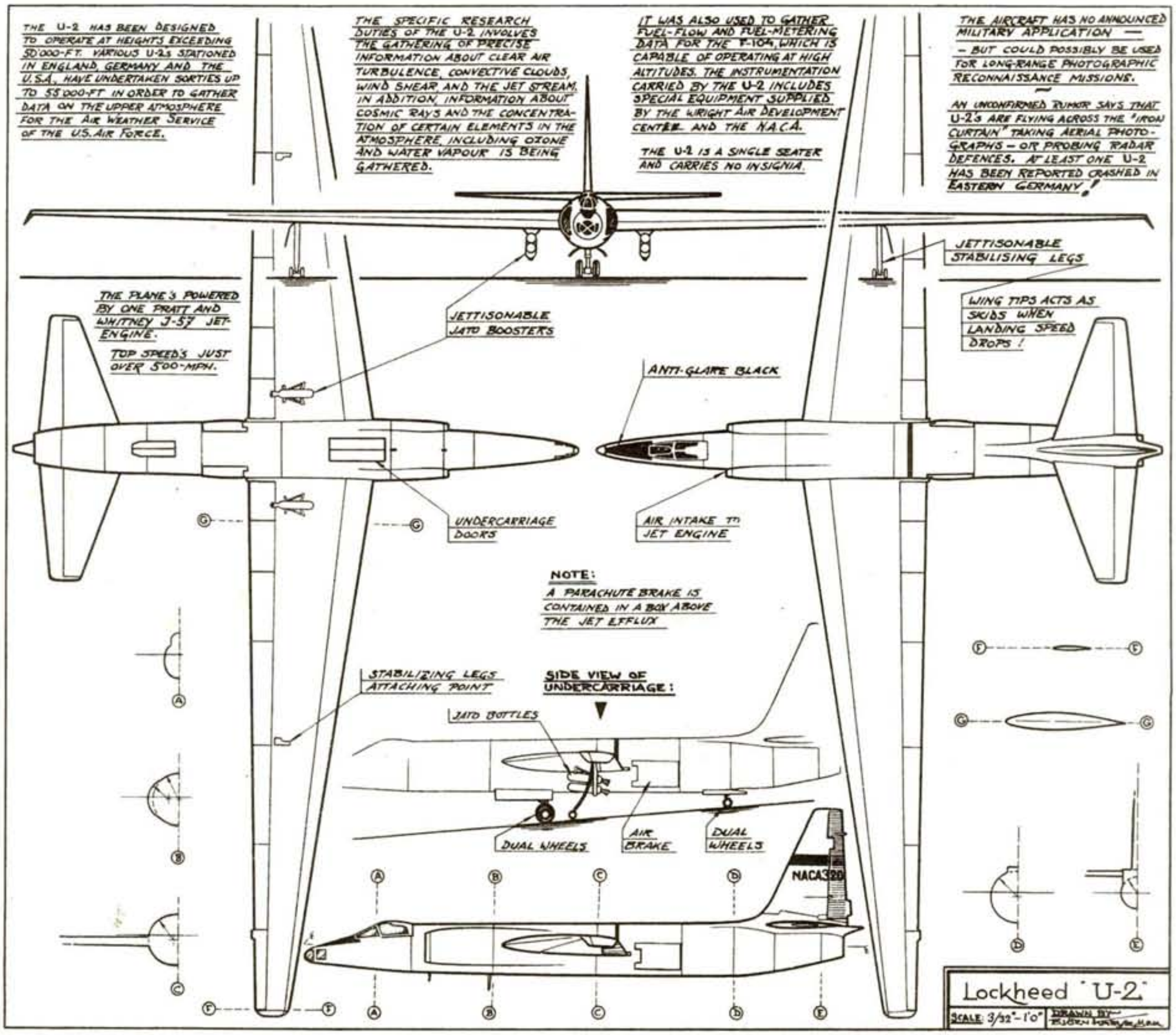


WEAKNESSES IN TESTING

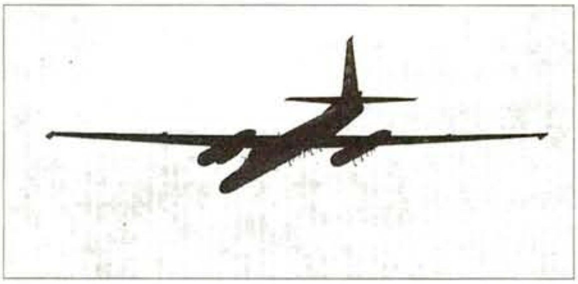
Multiple points of improvement are possible. Turbulent airflow is a factor. Accuracy of the scale, roughness of the runway, speed of the vehicle and friction in the rig will all conspire to "adjust" results. Remember that your aircraft is also not in perfectly smooth air; it has gaps in the hinge line, and it may have less than perfect airflow patterns. This was simply my way of testing control surface loads in the real world. And now, would-be engineers and aerodynamicists, you may line up and take your best shot. I will simply say that this is what I measured on that day, at that airport, with that test rig, and these are the results. Happy landings!

Planes Worth Modeling 3-View Documentation for Scale Modelers

Lockheed U-2 Dragon Lady



Forty years ago, in 1958, *Model Airplane News* found itself under scrutiny by some federal agencies for publishing the first 3-views of the Lockheed U-2. This was two years before Gary Powers was shot down by the Soviets and the U-2 became well known to the world. At that time (1958), the U-2 was probably not a very good model subject. Its slender wings and fuselage made it difficult to structurally design in model form and to find a suitable powerplant.



But times have changed. A U-2 flew into the airshow at last year's Oshkosh fly-in—no longer the hush-hush secret it was in 1958. That U-2, a U-2R, has some 400 square feet more wing than the U-2C flown by Gary Powers. As a model, the U-2 has become quite viable, with some of the new carbon-fiber/fiberglass building methodologies to strengthen the wings; and modern ducted-fan and turbine powerplants are more than up to the task of flying such a model; in fact, I saw one flying at the 1997 Arizona Jet Rally. —LM

SPECIFICATIONS	U-2C	U-2R
Wingspan:	80 ft.	103 ft.
Wing area:	600 sq. ft.	1,000 sq. ft.
Length:	50 ft.	62 ft., 9 in. (w/ std. nose)
Max. weight:	22,542 lb.	41,300 lb.
Max. speed:	460mph (at 65,000 ft.)	430mph (at 65,000 ft.)
Ceiling:	70,000 ft.	70,000 ft. plus
Powerplant:	P&W J75-PW-13B	P&W J75-PW-13B

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

Great Planes Ultimate .40

by TIMOTHY DIPERI

PHOTOS BY RICK TONAN

I'VE BEEN flying models since 1973 and have owned more than a couple of biplanes. It has, however, been several years since I had the pleasure of flying such an aggressive biplane as the Great Planes* Ultimate .40. Although this airplane is not a suitable first trainer, I can comfortably say that any competent intermediate pilot will have a great time with it. In addition, when the rates are turned up a bit, the airplane is sure to please any hotshot at the flying field.

A sturdy, lightweight bipe aerobat

SPECIFICATIONS

Model: Ultimate .40

Manufacturer: Great Planes

Type: sport aerobatic aircraft

Wingspan: 43.38 in.

Wing area: 742 sq. in.

Airfoil: symmetrical

Weight: 6 lb., 10 oz.

Wing loading: 20.6 oz./sq. ft.

Length overall : 47.75 in.

Radio used: Futaba 4-channel (9ZHPS) with four high-torque servos (S9201)

Engine recommended: .40 to .46 2-stroke or .70 4-stroke

Engine used: SuperTigre .51

List price: $199.99

Features: built-up construction with laser-cut parts; clear plastic canopy; pre-formed aluminum landing gear; ABS cowl and wheel pants; rolled, full-size, CAD-generated plans.

Comments: the Ultimate .40 is a very well-constructed kit that is quite simple to build for any level of builder. Its nice lines and big wings make it easy to fly, and it becomes super aggressive as you push the sticks to the limit.

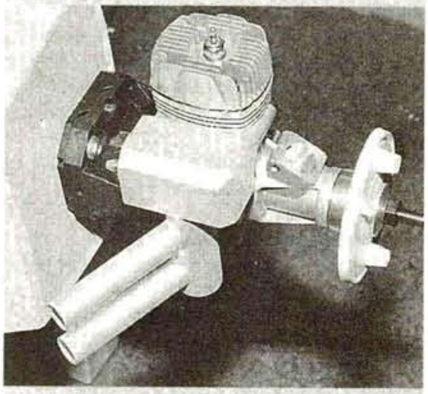
Hits

- A generously proportioned .40-size airplane, it is easy to track.
- Strong construction.
- Plenty of room for radio equipment.

Misses

- Cabane material should have been de-burred.

SUPERTIGRE .51



I researched powerplants for this airplane extensively. I wanted as much power/torque as I could get from an engine that had a low weight. The SuperTigre had all the attributes I required. It's approximately the same weight and size as most .40 to .45 engines, but it offers at least 10 percent more displacement. This seemed to be substantially better than trying to fit a much heavier .60 in the airplane.

To properly break in the engine, I used several tanks of Morgan's* Cool Power fuel. Morgan makes a special heli (30-percent nitro) fuel that works very well in any engine.

The SuperTigre .51 can swing a big prop, so I used an 11x5 Master Airscrew* and had good results. It will probably perform even better with an 11x6.

The Italian-manufactured ringed engine is equipped with the well known SuperTigre carburetor. This carburetor is very simple to set up and provides consistent, reliable performance. The Schnuerle-ported engine produces almost 1.5b.hp at 15,500rpm, which is more than enough to satisfy most modelers. The only thing I changed was the glow plug after the break-in period.

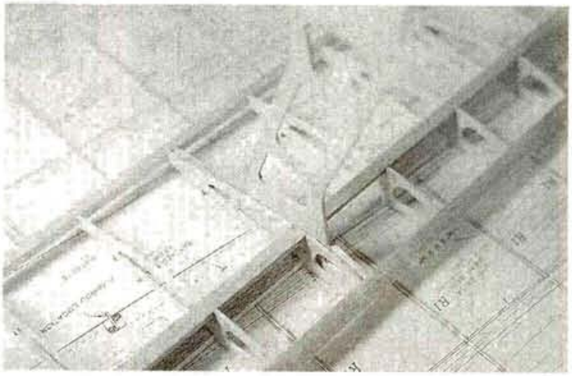
CONSTRUCTION

All of the tail surfaces are built from 1/4-inch balsa. Most of the construction uses 1/2x1/4-inch pieces that are cut from 36-inch strips. Because of the potential high loads on this airplane in flight, it is important to make accurate cuts so that each glued surface can be cemented flush to its mating surface. After the outer perimeter has been framed up, the inner ribs are cut from 1/4x1/8-inch balsa strips and glued into place.

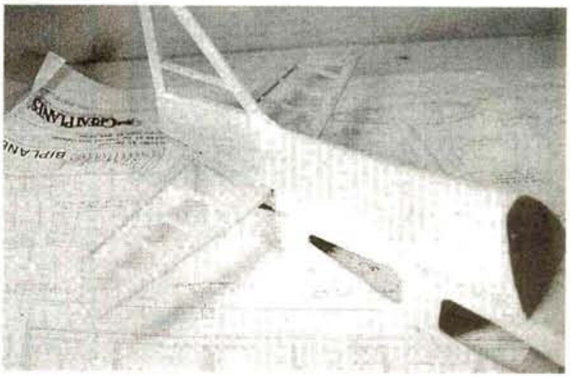
Start the bottom wing assembly by laying out the lower 3/32-inch balsa spars over the plans. Cut the root ends of the spar pieces to the appropriate angle (the wings are slightly swept), and glue them together at the wing's center. The die-cut ribs are then placed over the spar. Each rib has weight-saving lightening holes already cut out. In addition, the front and back of each rib has bottom tabs that ensure a warp-free wing. After the top has been sheeted, the tabs are cut off so the bottom can be sheeted. The wing doesn't use fiberglass reinforcing tape around the center section; instead, a single plywood joiner is sandwiched between the upper and lower spars; this results in a very rigid wing.

About 5 inches inward from each wingtip, one rib on each panel is modified to accommodate the strut that goes from the upper to the lower wing. The rib is essentially doubled, with lite-ply sections sandwiched at the forward and aft ends. This leaves a central slot in which the interplane strut is anchored. Once the wing has been sheeted from the leading edge (LE) to the spars, balsa capstrips are glued to the remaining exposed edges of the ribs. Shear webbing is applied between each rib and spans the distance between the aft, outer edges of the top and bottom spars. I used Zap* for the sheeting and capstrips and white glue for the webbing.

When installing the aileron torque rods on the wing's TE, be careful that glue does not seep into the plastic bushing. I found that a little petroleum jelly on the ends of the bushings helped keep glue out. The aileron servo mount is extremely strong, and its construction is an integral part of the center wing rib. Be careful not to let glue wick to the center of the cloth hinges. This happened to me; a hinge cracked and I had to replace it.



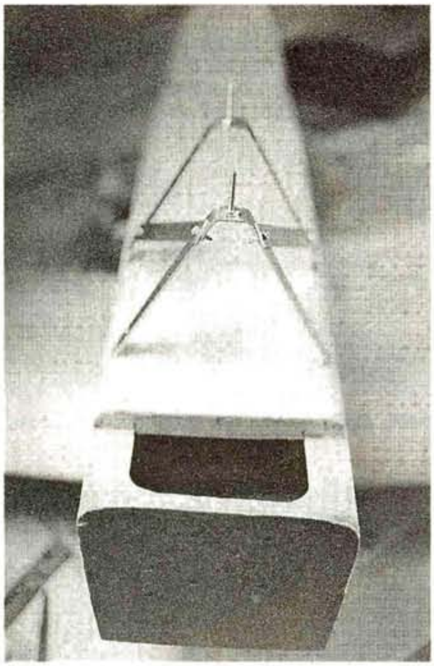
Note how the wing strut fits in a slot made by doubled outboard ribs.



The turtle deck blends into the tail.

The firewall is made of three laminated pieces of 1/8-inch plywood. I installed a SuperTigre* .51 2-stroke engine.

Each side of the fuselage is constructed from upper and lower sides glued together. In addition, each side uses an upper and lower plywood doubler. To achieve right thrust, the right fuselage side must be cut down at the front by 1/4 inch. Make sure that you mark these parts "right side," or you'll have a chance of getting left thrust! Since the airplane can be subjected to



Accurately set up the cabane struts, and aligning the top wing will be simplified.

extreme fuselage-twisting forces, a plywood fuselage doubler is also used where the empennage is mounted. The formers are fitted (without glue at this time) between the fuselage sides. Rubber bands are used to hold the fuselage sides to the formers. This technique allows time for framing up the fuselage and making the necessary adjustments.

The top and bottom fuselage decks are slipped under the rubber bands and held in place. When everything is in place and the plans have been reviewed, the assembly is glued with CA. I went over all the critical joints with white glue as well.

The bottom wing is attached to the fuselage with two 1/4x20 nylon mounting bolts for which holes must be drilled and tapped. Carefully align the wing.

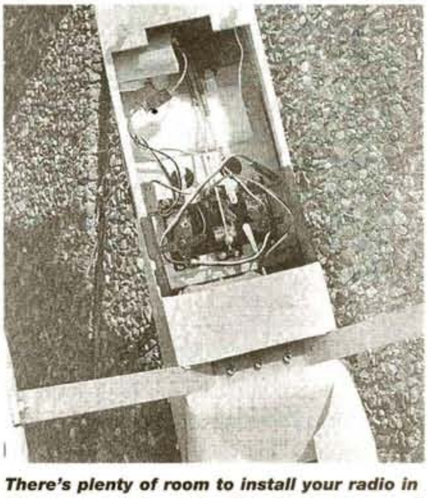
The tail is glued to an 1/8-inch plywood stab plate. Again, it is critical that the measuring be done carefully prior to gluing. Build the rear turtle deck using two formers and two 1/4-inch balsa sticks covered by a 3/32-inch-thick sheet of balsa. A single 1/4-inch balsa block is glued to the top of the turtle deck. Finally, the entire section is sanded to shape.

The aluminum cabane struts are fitted into the upper fuselage through slots and secured with 4-40 nuts and bolts. The slots are covered by a 1/2-inch 1/4-round stick and are easily notched using a small X-Acto knife. After covering the airplane, I attached the cabane assembly using Loctite* on all of the hardware.

The top wing is built almost exactly like the bottom wing, with some minor differences in the center section to facilitate the wing's attachment to the cabane.

The center section construction uses four strips of plywood measuring approximately 6x1 inches. These strips, which anchor the cabane assembly, are recessed into the center rib and into one rib on each side of center, top and bottom. One set is approximately 1 inch in front of the spar, and one set is about 4 inches behind the spar. A hole is bored through (top to bottom) the center of each strip. These two holes are used to secure the wing to the cabane. During this process, I found that to properly set the wing on the cabane, I had to elongate four of the holes in the aluminum cabane assembly. Be careful with the metal, since the pieces are very sharp (sand them at the ends).

Once the wings and fuselage had been completed, I prepared the cowl and wheel pants (incidentally, wheels are not included in the kit). These items are made from vacuum-formed ABS plastic and are quite easy to finish.



There's plenty of room to install your radio in the fuselage. I used a Futaba system and four high-torque servos.

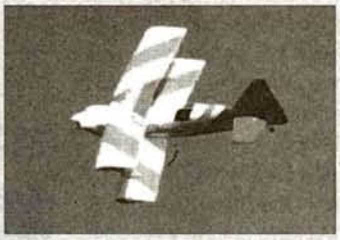
I used LustreKote* paint on the cowl, wheel pants and interplane struts. I was quite pleased with how well the paint matches the MonoKote*. I finished the

FLIGHT PERFORMANCE

• *Takeoff and landing*

Due to its fairly wide wheelbase, the Ultimate .40 has good ground handling characteristics. During takeoff, when power is applied, the tail pops off the ground very quickly. The large rudder makes runway tracking easy, and with a little backpressure, the airplane takes off smoothly and sets up a nice climb angle.

During landings, the airplane can be slowed down considerably, and consistent 3-point landings can be made with a little practice. Due to the large rudder/vertical fin area, the plane will tend to weathervane into a crosswind. To maintain the correct runway tracking during a crosswind landing, keep the upwind wing down into the crosswind and add some opposite rudder. The plane did not tip-stall during the full-stall landing.



• *Low-speed performance*

The Ultimate can be slowed by flying with a fairly high angle of attack before it will stall. I found that it would actually perform a very predictable stall with no tendency to spin. Several pilots at the field who fly the larger version of this airplane commented on its tremendous stability at very low speeds.

• *High-speed performance*

With Morgan's 30-percent helicopter fuel, the SuperTigre .51 really puts out the power. It achieved all the performance I desired and put out smoke as if it had a smoke system.

It has very good vertical climbing power, and there's plenty of speed. However, given the design of the airplane, its speed is not like that of a low-drag racing plane.

• *Aerobatics*

Its control authority is excellent, and loops and rolls are a breeze, as are sustained inverted and knife-edge flight. The airplane truly is a great performer at practically any maneuver you can imagine. I only wish my fingers could push the flight envelope of which this airplane is capable.

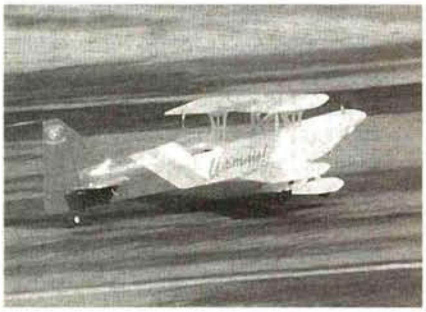
I did some testing on high-deflection, full-power maneuvers. The airplane will high-speed stall with full elevator deflection. I neutralized the controls, and the model recovered by itself.

To facilitate extended knife-edge flight, I added some aileron and elevator mixing to the rudder input. I used the control surface deflection percentages indicated in the manual and found no need to alter them.

balsa surfaces with a combination of MonoKote and MonoKote trim tape. To apply the trim tape, I just sprayed on some window cleaner and "slid" the tape into place. I then used a heat gun and slowly squeegeed the water out.

When the airplane was completely finished, I installed the radio equipment. I chose to use my trusty Futaba* 9ZHPS with S9201 servos. I recommend the use of higher-torque servos, since there will be a fairly aggressive load on the control surfaces. Once the radio was in and control surfaces had been checked, I mixed in some negative expo for all the control surfaces. I found that minus 25 percent expo worked well throughout the entire flight envelope.

To link the top and bottom ailerons, I used a cut-down control horn and a piece of threaded rod. The rod was cut to length, and the clevises were adjusted so



that each aileron was neutral when the stick was centered.

To fuel the model, I used a Du-Bro* EZ filler. I strongly suggest that you use this type of system, since it can be a challenge to get to the fuel line through the opening in the front of the cowl.

The instructions are explicit on proper balance and wing incidence. I used a Robart* incidence meter to check the wings and tail. To get the correct incidence on the top wing, I needed to add two washers to the front attachment bolts between the underside of the wing and the cabane assembly.

The CG point is pinpointed on the plans. The manual tells you not to exceed plus or minus 1/4 inch of this CG point.

CONCLUSIONS

The Ultimate .40 is a very well-constructed kit that is quite simple to build for any level of builder. Its nice lines and big wings make the airplane easy to fly, and it becomes a fairly aggressive flyer as you push the sticks to the limit.

Addresses are listed alphabetically in the Index of Manufacturers on page 118.

RPM REAL PERFORMANCE MEASUREMENT

by DAVE GIERKE

ENGINE FORUM: READERS WRITE

ONE OF THE MORE interesting facets of writing "RPM" is the feedback I get from readers. Many have taken the time to write, giving this column very positive reviews. Most also have a question or two. Since many others probably have similar questions, we're devoting this month's column to some of them and hope that the answers will be of interest to you.

HOT-RUNNING ANTIQUES

Jerry Burk of Arlington, TX, writes: *At a recent SAM (Society of Antique Modelers) contest, two separate modelers had Brown Jr.- powered entries. Both had rigged additional heat sinks to the engine head: one by means of a 2-inch square of aluminum under the plug and the second by means of a contemporary glow head, lathe-turned to fit under the plug and over the top two regular fins. Is there a problem here that I don't realize? Do Brown .60s run too hot?*

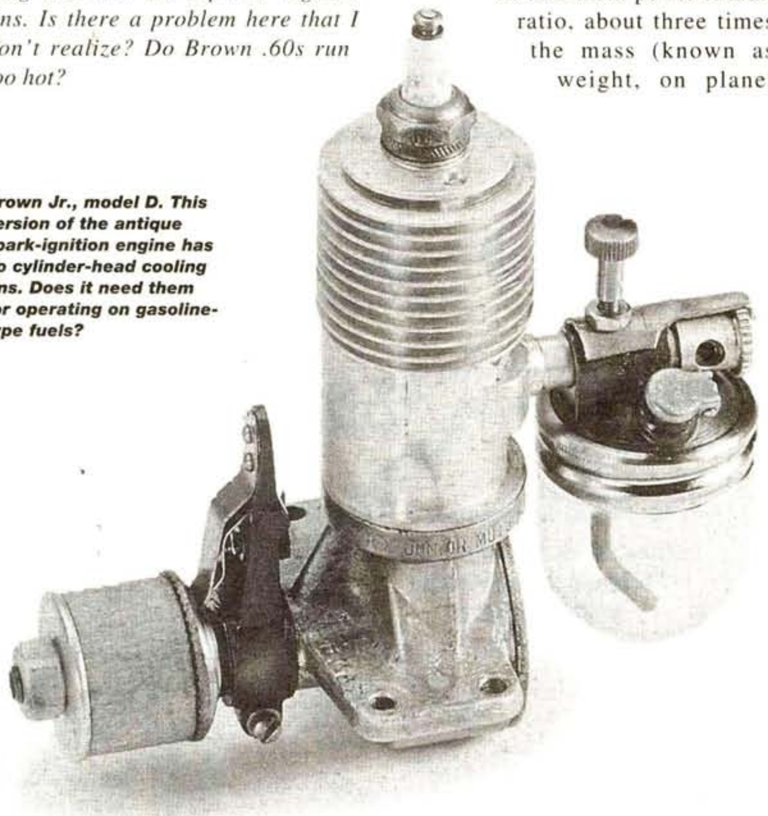
Jerry, I assume that the antique Brown Junior engines (1930s) that you refer to were operating on gasoline. Gasoline causes engines to run hotter than alcohol fuels because it doesn't remove as much heat when vaporizing in the carburetor. This cold area acts as a heat sink for all other parts of the engine, helping it to run cooler. In a process known as heat of vaporization, alcohol (methanol, in our case) actually causes moisture from the air to sublimate (change state without becoming a liquid) as frost and ice on the outside of the carburetor in hot, humid weather. Years ago, when I was involved in automotive drag racing, it was common for ice to cover the carburetor and intake-manifold runners of alcohol-fueled dragster engines. Maybe you've noticed the phenomenon on our engines (especially 4-strokes)?

Alcohol engines cool better than gasoline-fueled units for another reason: as each fuel operates at its maximum power fuel/air ratio, about three times the mass (known as weight, on planet Earth) of methanol passes through the engine as compared to gasoline. This is liquid cooling—something that many experts believe is the 2-stroke-cycle engine's primary method of removing unwanted and potentially damaging heat.

Nevertheless, Brown Junior engines were originally designed and manufactured to operate on gasoline. They ran admirably unless the lubrication (oil content) was deficient or the needle-valve setting was lean (too little fuel for the available air). These early engines required several hours of careful break-in before their mild steel pistons and cylinders would tolerate extended operation without seizing. The secret to success, especially with the close-fitting lapped version (model B) was extended break-in. The model D was fit with more clearance, which is typical for all ringed engines, and didn't require nearly as much bench running. By comparison, Baby Cyclone engines from the same era offered a separate aluminum finned cylinder-head attachment (heat sink) that fitted under the spark plug. These were considered unnecessary by most modelers of the day and were discarded. When a new engine is properly broken in, the piston/cylinder fit has enough clearance to maintain compression while still allowing the piston to expand faster than the cylinder without seizing. When an engine is worn out, however, the clearance between the piston and cylinder is too great; cold compression is weak, and power is diminished because of excessive blowby during the expansion event.

Two tricks used by old-timers to prolong the lives of worn-out engines were to: 1) use higher viscosity ("heavier") lubricating oil mixed with the fuel to improve the cold compression seal for starting, and 2) use a heat-sink head to reduce the expansion of the cylinder, which improves the power-robbing blowby condition.

To summarize: if your gasoline-burning, antique spark-ignition engine isn't worn out, and it's properly broken in, has an adequate supply of a good lubricant and is operated with a non-lean needle-valve setting ... forget the heat-sink head.



Brown Jr., model D. This version of the antique spark-ignition engine has no cylinder-head cooling fins. Does it need them for operating on gasoline-type fuels?

IS ANYONE OUT THERE?

Carlos S. Fondrer, of San Diego, CA, writes:

I am interested in the O.S. .52 4-stroke engine. Information on O.S. engines is nearly impossible to obtain. Phone calls to the distributor are answered by recordings. It is not possible to talk to real people, especially someone who knows anything. The ad in the Tower Hobbies catalog mentions that the carburetor is reversible (a good idea), but does not mention whether it is air-bleed, 2-needle or something else. It is probably not important to most people, but it is to me. Can you describe the carburetor on this engine?*

Carlos, letters such as yours are a manufacturer's or distributor's worst nightmare. Contrary to your unfortunate experience, companies spend a good deal of time, money and effort to ensure that potential customers have access to the information they need to make intelligent purchases. With fierce competition at home and abroad for discretionary leisure-time dollars, the hobby industry is acutely aware of its responsibilities.

Occasionally, someone such as you falls through the cracks. I spoke to an official from Tower Hobbies, and he indicated that you should have been referred to a technical representative to get an answer to your question. Some questions are even too complicated for these people; after all, nobody knows all the answers! Fortunately, Tower Hobbies has Hobby Services, headed by Bill Baxter. Bill is an expert concerning O.S., SuperTigre and OPS engines. For repairs and technical questions concerning these products, give him a call: Bill Baxter, Hobby Services, (217) 398-3639, ext. 267.

By the way, the O.S. .52 has a twin-needle-valve carburetor for effective control of high- and low-speed operation.

DIESELS & CONVERSIONS

Frank Hasty of Brunswick, GA, writes with concerns about diesel head conversions:

... you don't get something for nothing. What happens inside a glow engine designed for methanol when it is run on compression ignition? Do the hp, torque and rpm curves just move around without changing stresses on components? What happens to the bmep (break mean effective pressure)? Are the changes insignificant? Is there a power gain? How do the diesels compare to glow as far as power is concerned?

I noticed something interesting concerning my PAW .19 diesel: exhaust residue with the 2-blade 9x6 and 3-blade 8x6 (Graupner) was almost clear, but with the 10x6, it became black. I wonder why?

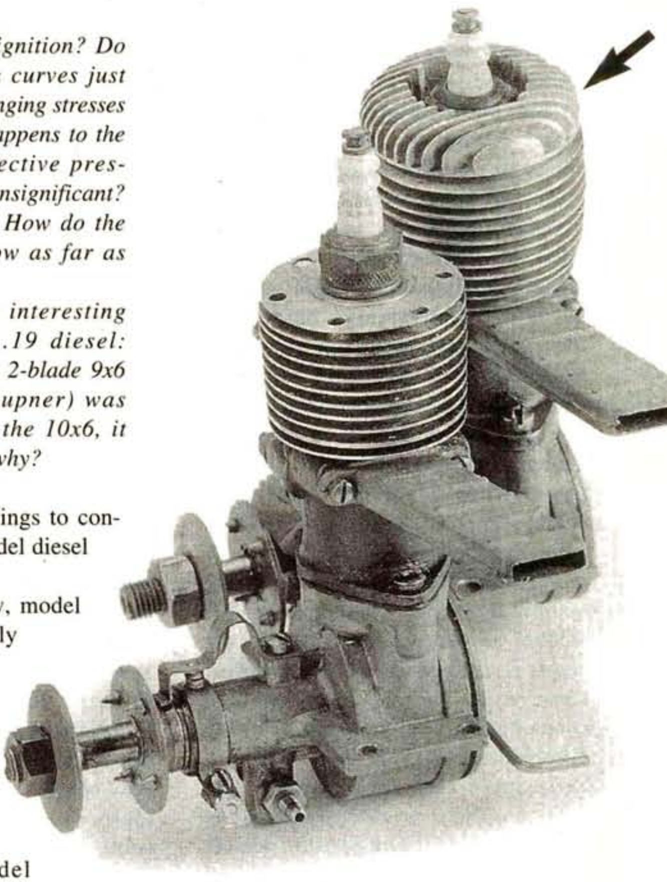
Frank, here are a few things to consider when operating model diesel engines:

• As you probably know, model diesels differ significantly from their big brothers. Large diesels compress air to an elevated temperature; then, kerosene-type fuel is injected as a vapor into the heated air, where it ignites. Model diesels work the same as 2-stroke glow engines; they're crankcase-charged. Air and a kerosene-based fuel mixture are inducted into the crankcase (below the piston) through a carburetor. The combustible mixture is then moved through cylinder transfer ports into the combustion zone above the piston, where it's compressed and heated to ignition.

• Diesel-head conversions require the engine to withstand much higher structural stresses due to elevated compression ratios. Forces acting on the piston, cylinder, wristpin, connecting rod, crankpin and crankcase can cause premature failure in some glow engines designed for lighter loads. Diesel-head conversions with pressed-in crankpins should be viewed with suspicion; they're candidates for failure.

• Superior piston/cylinder fits are essential to minimize the combustion gas blowby problems associated with the diesel's elevated combustion chamber pressure.

• Flat-top pistons are much easier to adapt to conversion diesel heads. Heads with adjustable contra-pistons are much more flexible than "fixed compression" types. Atmospheric conditions, fuels and using props of different sizes make adjustability desirable.



Vintage Baby Cyclone .36 spark-ignition engines were designed to operate on gasoline. Notice the finned aluminum head (accessory item) clamped to the steel cylinder by the spark plug (arrow).

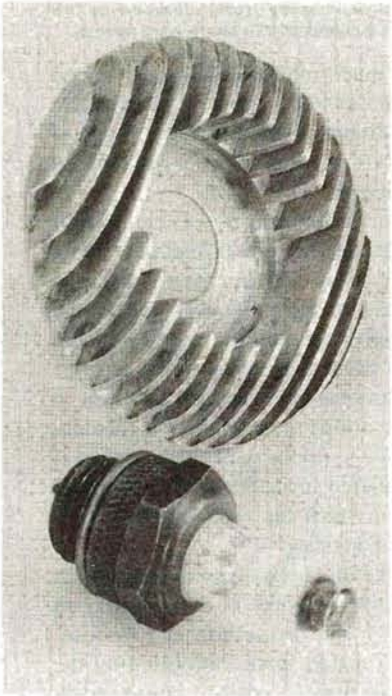
• For maximum power, methanol fuels operate at an air/fuel ratio about half that of kerosene blends. Therefore, at similar shaft speeds, the compression ignition engine is more fuel efficient by a factor of about two.

• Kerosene-type fuels are excellent in their ability to resist knock (detonation)—a serious combustion defect—compared to methanol (or gasoline) fuels, which can't tolerate high compression ratios.

The big advantage of compression ignition engines is their ability to turn large propellers at low rpm. High piston force multiplied by the crank throw (radius) equals high twisting force (torque) at the shaft. Standard methanol glow engines can't turn props this large because of restricted compression ratios. Diesels

can also run at high rpm when provided with adequate port and induction timing. However, as with all reciprocating piston engines, bmep and torque decline quickly after a certain speed due to breathing restrictions (air), and horsepower drops accordingly (torque x rpm = horsepower). Also, at elevated shaft speeds, the diesel/propeller combination starts to get noisy! Conversely, the diesel's low-rpm torque advantage is boosted by reduced exhaust and propeller noise—a tough combination to beat.

From the perspective of fuels, model diesels (kerosene) fall short on power when compared to the glow engines (methanol). Energy consumption per second (power) favors methanol when fuel/air ratios are optimized; adding nitromethane to the alcohol blend dramatically shifts the power advantage toward that witches' brew, at the expense of greater fuel consumption and cost. Incidentally, nitromethane doesn't work well with kerosene/diesel applications. The glow engine's power advantage is demonstrated in competition events such as control-line speed and R/C pylon racing, where high rpm reign supreme.

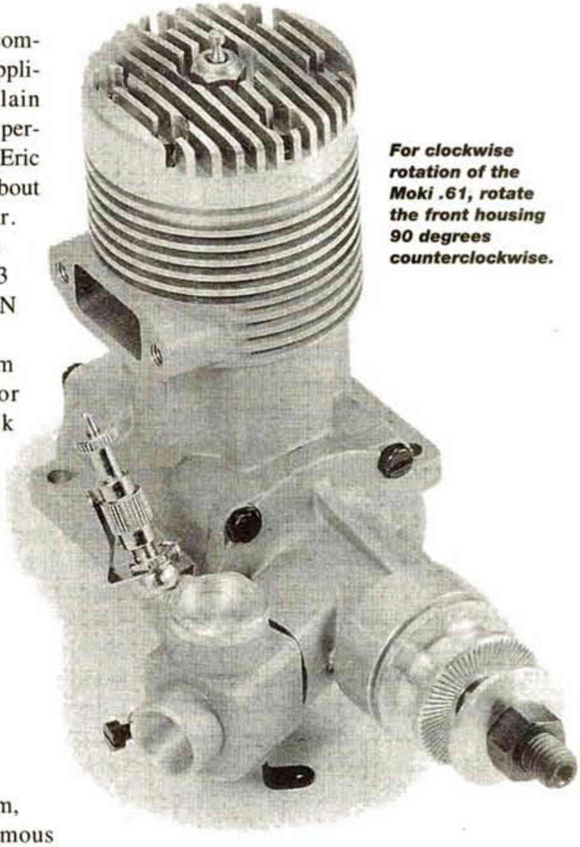


Close-up view of the lightweight aluminum head for the Baby Cyke. The large thread diameter (3/8 inch) Champion spark plug clamps the unit to the cylinder head.

Good old castor oil is recommended for diesel engine applications; 30 percent for plain bearing crankshafts and 20 percent for ball-bearing types. Eric Clutton has written much about this in his book, "Dr. Diesel's Diary," available directly from him at 913 Cedar Ln., Tallahoma, TN 37388.

Eric suggests a maximum propeller size of 11x6 for your PAW .19. The black exhaust usually indicates over-compression or too much propeller load for the compression.

To summarize, the power advantage goes to glow, with high shaft speeds, while low-rpm torque goes to diesels. If you don't mind the kerosene/ether/amyl nitrate smell, they offer a quiet, low-rpm, big-prop combination. Famous scale modeler Dave Platt, who emigrated from England years ago, suggests, "... if you grew up with diesel fuel, you'd love the aroma!"



For clockwise rotation of the Moki .61, rotate the front housing 90 degrees counterclockwise.

TWIN ENGINE MOKI

Ernest Hawkins writes:

I have just finished reading your write-up on the Moki M-60 engine ... it looks as if the front bearing housing is the same size as the backplate. I'm curious: can these components be interchanged so the exhaust is on the opposite side? This would allow me (on a twin-engine airplane) to point the cylinder heads away from the fuselage and still have the mufflers pointing down.

I have read somewhere that the rotation can be reversed by turning the front housing 90 degrees in the direction that you want to rotate. If true, this would allow me to cancel out the torque on the model. I would also like to hear from you on the potential of the new K&B for a similar application.

Ernest, your questions about Moki and K&B* engines are interesting. After speaking with Jim Gerard of Gerard Enterprises*, importer of the Moki engine line (from Hungary), I can see no reason why the M-60 can't be changed end for end concerning the front housing and rear cover units. There is no desaxé cylinder-offset problem, and the front and rear hole patterns are the same. I doubt that any significant performance differences will show up, either. However, be sure to rotate the connecting rod 180 degrees so the crankpin end of the rod has its chamfered side facing the crankshaft for proper lubrication.

If you want one of the engines to rotate clockwise (as viewed from the front), rotate the front housing 90 degrees counterclockwise.

On the new K&B ABC .40, be aware that if the shaft rotation is reversed, the crank's spiral groove pump, designed to control fuel leakage from the engine through the front bearing, will now force fuel out of the engine! K&B will sell you a reversed rotation crankshaft and a reversed crankcase (exhaust on the opposite side) for about $30; contact them for the particulars.

**Addresses are listed alphabetically in the Index of Manufacturers on page 118.*

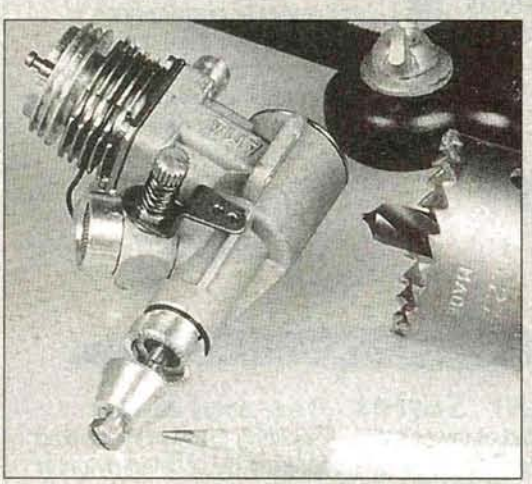
MODEL AIRPLANE NEWS
HOW TO

Build a Small-Engine Test Stand

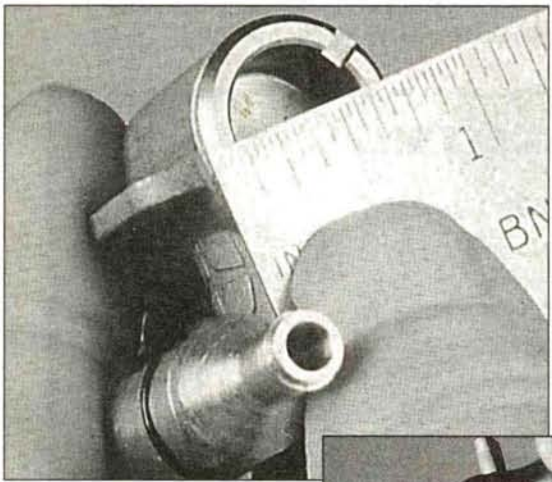
Break-in made easy

by RANDY RANDOLPH

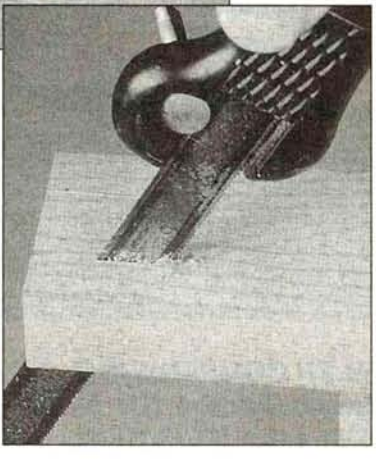
EVERY NEW ENGINE should be broken in, and most instruction manuals suggest that this be done before the engine is installed in an airplane. The best way to handle break-in is with a test stand that fits the engine. The photos show how to make a simple wooden test stand that's adequate for .03- to .20-size engines. The stand can be held in a vise or mounted on a bench and provides solid, vibration-damped mounting for glow and diesel engines.



1 ***Transfer these measurements to the hardwood mount and, using a coping saw or hacksaw, make a cutout that just fits the engine. In this case, the hardwood used for the mount is 1x2x6 inches because the mount is for small engines.***



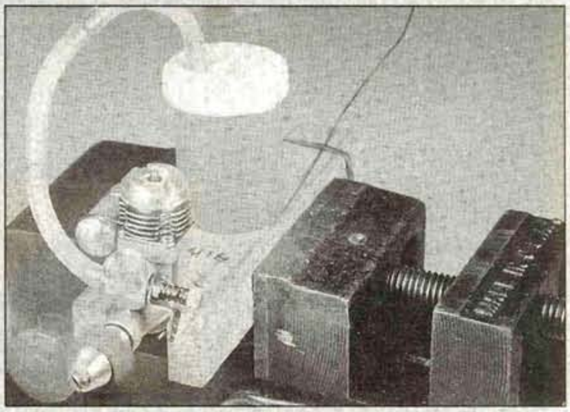
2 ***Measure across the widest part of the engine crankcase (in this case, $^{11}/_{16}$ inch), as well as the distance from the backplate to the front of the crankcase.***



3 ***Other than a $^{1}/_{16}$-inch or $^{3}/_{32}$-inch drill bit and wood screws to fit the engine mounting holes, you'll need a length of 1x4-inch hardwood, a ruler, a $1^{1}/_{4}$-inch hole saw, a hacksaw, or coping saw and a 12- or 16-dram pill bottle. These pill bottles are standard sizes used by all pharmacies.***

4 ***Fit the engine into the cutout and mark the mounting holes with a pencil. Drill the mount for the proper size screws, using a $^{1}/_{16}$-inch drill bit and no. 4 screws for small engines and a $^{3}/_{32}$-inch drill bit and no. 6 screws for .09 to .20 engines. Treat these holes with CA to prolong the life of the mount.***

5 ***Mark a spot 2 or 3 inches behind the mount and use a hole saw to drill a $1^{1}/_{4}$-inch hole all the way through the mount. This will be a good tight fit for the pill bottle, which will become the fuel tank. Attach the engine to the mount with the appropriate wood screws or machine screws.***



PHOTOS BY RANDY RANDOLPH

6 ***Drill two holes in the top of the medicine bottle's cap—one that just fits the fuel line and a small one for a breather hole. A piece of florist's wire, held in place with a rubber band behind the tank, controls the throttle. A 12-dram pill bottle will provide about 10 minutes of run time; a 16-dram pill bottle provides around 8 minutes for larger engines.*** +

by LARRY MARSHALL

PROPS AND POWER

Last time, I discussed using your knowledge of glow power to select a proper electric motor system. The conclusion of that discussion was that we needed to answer two questions: "How much power is necessary to fly the aircraft?" and "What propeller performance is required to convert the power to thrust in such a way that the plane flies the way I want it to fly?" As best I can, I'll address those questions here, with the same, non-mathematical approach that I've used thus far—or at least I'm going to try.

Before getting into this, however, I need to say a word or three about "rules of thumb" that we will use to make some of our decisions. For these rules to be useful, each must be used carefully, with some knowledge and much caution. The knowledge should give you the power to know when the rules apply, and the caution should temper your enthusiasm for the resulting answer generated by the rules. Always remember that these guesstimates are a substitute for more sophisticated, more complete modeling and that, while you might "get close" with these rules, you'll also run the risk that they won't precisely define your aircraft or performance needs. What can make rules of thumb useful is a simple realization that while they work pretty well, they are not precise. Flight tests will still need to be conducted to determine the best system for your particular model.

HOW MUCH POWER DO WE NEED AND HOW DO WE GET IT?

I've mentioned before that an attribute of electric power systems is that their power is highly correlated to their weight. Thus, we've got to worry about that in making our decisions about which power system to use in a particular aircraft. An easy way to do that is to keep track of what the wing loading of your aircraft will be if you use a particular power system. For most sport planes—unless they're very large or very small—I shoot for a wing loading in the 22 to 25 oz./sq. ft. range. Smaller planes need lower wing loadings, and you can get away with higher loadings in larger models. See Larry Renger's article in the December 1997 issue of *Model Airplane News* for a discussion of these scaling problems.

So, the first step is to figure out how much your plane needs to weigh to give you a reasonable wing loading. Just so we have an example to refer to, I'll go through the steps of determining a power system for a Hangar 9 Cub, because I've got one and it's easy to get the numbers. This plane has a wing area of 850 square inches. With a Saito .56 in it, the plane weighs 6.5 pounds. So, let's make it an electric-powered plane with a wing loading around 25 oz./sq. ft. With an 80-inch wingspan, this Cub is a bit larger than the average sport plane and should fly like a lightly loaded Cub with that wing loading.

Let's assume the Saito and fuel tank weigh 1.5 pounds, giving us an airframe weight (including radio) of 5 pounds. We won't consider lightening this glow plane, just to keep things simple. To have a wing loading of 25 oz./sq. ft., this Cub can weigh 9.25 pounds (the plane has 5.9 square feet of wing, so 5.9 x 25 = possible weight).

TABLE 1

WING LOADING	STALL SPEED	3X STALL
10	12	35.8
12	13	39.2
14	14	42.3
16	15	45.2
18	16	48.0
20	17	50.6
22	18	53.0
24	18	55.4
25	19	56.6
26	19	57.7
28	20	59.8
30	21	61.9

Calculated by stall speed = 3.77 x square root (wing loading)

The next concern is the flight envelope needed to make us happy. You can estimate stall speed and desired top speed before selecting a power system. Stall speed is affected by many parameters, but it can be estimated from the wing loading of the aircraft. Avoiding the arithmetic, refer to Table 1 to know the stall speed of a "typical" aircraft. These values are very rough guesses, as airfoil, aircraft planform, etc., will affect the true stall speed, so some caution should be used in interpretation.

For most flying, a top speed that is three to four times the stall speed provides sufficient flight envelope for most models. Again, some common sense is useful; if you're building a pylon racer, you'll want more speed. For our Cub, let's stick with three times the stall speed, as Cubs shouldn't fly fast.

At this point, we've determined that our Cub can weigh up to 9.25 pounds, 4.25 of which can be power system. We've determined (from Table 1) that its stall speed will be around 19, and we'd like it to have a max speed around 56. Just to let you see how I would think about this, I'd assume that 19 is actually a bit higher than the actual stall speed because of the nature of Cub wings and planforms, and I would assume that around 50mph would be a good target for top speed. Besides, round numbers are easier to work with when I'm driving down the road.

To fly a model with electric power, people have found that a good way to determine the power requirement is to assume that 50 to 60 watts/lb. are needed to fly the plane through loops and rolls. More extreme aerobatics may require more, and just putting around the patch requires a lot less. Until we understand a lot more about electric-power systems, let's take this as gospel and calculate the power

TABLE 2
Watts being absorbed by the prop

DIAMETER	PITCH	6000	7000	8000	9000	10000	11000	12000
13	8	260	413	616	877	1203	1601	2079
13	10	325	516	770	1096	1504	2001	2598
14	6	262	416	621	885	1213	1615	2097
14	8	349	555	828	1179	1618	2154	2796
14	10	437	694	1035	1474	2022	2692	3495
15	8	461	731	1092	1554	2132	2838	3684

requirement for our Cub by multiplying the plane's projected weight by 60 (60 x 9.25 = total input watts required), giving us 555 watts. Being lazy, and realizing that we're just forming ballpark assessments, I could have dropped the ¼ pound and just multiplied 9 x 60 = 540 watts; no sense in dragging out calculators here.

So, at this point we know that if we produce a 9-pound Cub with a 4-pound motor system in it, that motor system needs to be absorbing 540 watts to fly it the way we want it flown. We're making progress. Note that I said the motor system needs to be "absorbing" rather than "producing" 540 watts. Electrics flyers like to think in terms of input power rather than output power because measuring it is a whole lot easier. It's important to realize that the 50 to 60 watts/lb. rule of thumb is based on the assumption that we are using a good quality cobalt motor that will run with a 70 to 80 percent efficiency.

But different motor types have different efficiencies. In fact, any motor will vary its efficiency depending on how you've set it up. For the moment, though, we'll assume that we're running all power systems in their "sweet spot" and getting good efficiency from them. Under those conditions, we find that ferrite motors are less efficient than cobalt motors and that brushless motors are more efficient than cobalt, brushed motors. So, if we're going to apply the 50 to 60 rule, we should adjust it if we're going to use other types of motors. While not precise, I assume 70 percent efficiency for cobalts, 60 percent for ferrite motors and 80 percent for brushless motors. These are fairly conservative estimates, but having a bit more power than planned isn't a bad thing. For the next step, though, we've got to make those adjustments to our input power. When we do this, we find we need 540 watts for a cobalt motor, 590 watts for a ferrite motor and a bit less than 500 for a brushless motor. This will give us roughly 380 watts to the prop, regardless of motor type.

WHAT SORT OF POWER DO WE NEED?

We determined that we'd like our Cub to have a top speed of 50mph. We can quickly calculate the theoretical top speed of a power system by the simple arithmetic, pitch speed = pitch x rpm (in thousands). So, if you spin an 8-inch-pitch prop and want to go 50mph, all you need to do is divide the speed by the pitch (50÷8 = 6.25), which means you need to spin it 6,250rpm to attain that speed. There's no precision here and none intended. There is a slight correction factor required to calculate the exact pitch speed, and a particular plane may or may not be capable of reaching pitch speed. But it's sure easy to divide pitch into speed, and we're after simple here. As you'll see, it's good enough.

With that calculation done (in our heads), we know that we need to spin a prop with 8-inch pitch at 6,250 to reach our desired airspeed. We also need to put 540 watts into the system that's spinning that prop so we'll have 380 watts at the prop. So, let's look at the table I presented last time and find an 8-inch-pitch prop that absorbs 380 watts. I guess I didn't plan very well, as my chart kind of skipped over the props we need to look at. So, Table 2 provides some data for 13- and 14-inch props. What we can see is that a 13x8 absorbing 380 watts will spin between 6,000 and 7,000rpm; so will a 14x8. The difference is at which end of the 6,000 to 7,000rpm range we will be.

A SHORTCUT?

Now, let's take a breather. Grab a cup of coffee, lean back and think about what a glow flyer would normally do to fly this Cub. Our Saito .56 spins a 13x5 about 8,500 to 9,000rpm and the plane flies great, though it's overpowered. You've just waded through a bunch of words that explain a simple process and came up with the need for a 13x8 or 14x8 spinning 6,000 to 7,000rpm. Not too different, is it? The big difference is that we'll probably have a bit better prop efficiency by spinning a larger, deeper pitch prop at a slower rpm. The important thing to note is that generally, a good electric solution will come if you take what you normally would do with a glow motor and translate it (in terms of power) to a larger prop spinning more slowly. We'll continue next time with the long and short of selecting an electric motor to spin the prop we've just selected.

FMA RECEIVERS

Because of the high interest in small, Speed 400-powered planes, there are a lot of folks looking for small receivers and pondering what to do about that long receiver antenna that hangs out the back of these little

birds like a piece of spaghetti. Without a lot of fanfare, FMA has quietly given us solutions to these problems. Their 6-channel Tetra (single conversion) and 8-channel Fortress Micro (dual conversion) receivers come in AM or FM and weigh almost nothing. They are very compact and have the servo plugs on the end of the receiver, making them ideal for small fuselages.

Another really neat thing about these receivers is that the FM units are shift-switchable; these receivers can talk to transmitters whether they put the pulse encoding on the negative (Futaba and Hitec) or positive (JR and Airtronics) side of the carrier. Some high-end transmitters allow you to set how commands are broadcast, but since so many transmitters do not, this feature of the new FMA receivers is a *really big deal*, in my view. Being shift-switchable allows these receivers to be used with *any* radio on the market. No longer do we have to be "stuck" with one brand of radio because we've got a bunch of receivers that will only talk to one brand of radio; we are free at last!!

The FMA Tetra measures 2.13x0.80x0.55 inches and weighs less than 1/2 ounce.

The FMA Fortress Micro receiver measures 2.27x1.00x0.65 inches and weighs 0.6 ounce.

With most receivers, the antenna serves two functions. It intercepts the signal (and longer is better for this), and it serves as part of a tuned circuit (and exact length matters most here) that provides the selectivity our systems require. If you cut the antenna of a conventional receiver, you will lose range *and* you will also detune the receiver. The only way to get away with this with a conventional receiver is to have the ability to retune the front end coils of the receiver for the shorter antenna. Most of us have neither the expertise nor the equipment to do that sort of thing. If you could do this, however, you could cut the antenna, sacrifice some range–which isn't a problem for small airplanes that are flown close enough so we can still see them–and solve the dangling antenna problem.

But FMA has base-loaded the antenna of its receivers, providing us a workable solution. Without going into details I don't understand well enough to explain anyway, this eliminates the antenna itself from the tuning of the receiver. Thus, if you change the length of the antenna, you decrease range but you do not de-tune the radio. Keith Shaw, noted electrics flyer, has done some tests that show the length of the FMA antenna is directly related to range. Thus, if you've got a small airplane that you're not going to fly very far away from you, cutting the antenna down a bit (some shorten it to half its normal length) still provides solid radio contact between you and the plane. I have verified this with FMA, by the way.

When flying sailplanes or larger aircraft, this reduced range will likely result in problems and is not advised and/or recommended by either Keith, FMA or me. Contact FMA at (800) 343-2934, or http://www.fmadirect.com.

Air POWER

by CHRIS CHIANELLI

TURNING IT UPSIDE-DOWN?

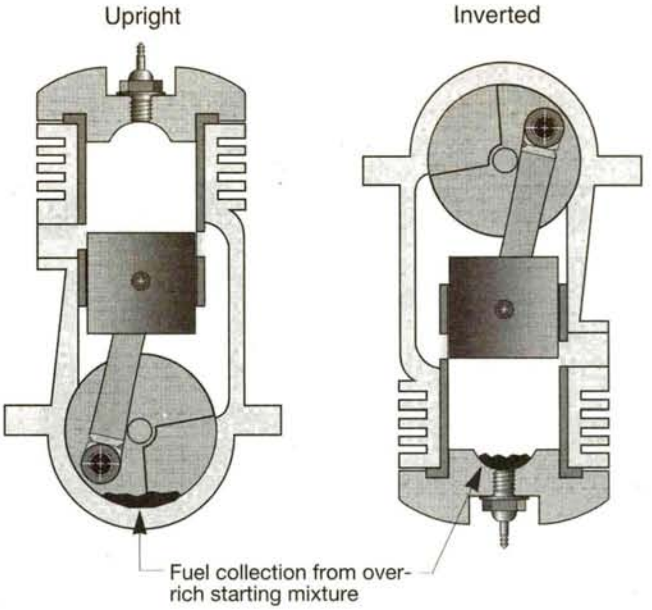
I received an email from Ranald Hay (New York), who asked about engine mounting. I thought the answers might help many of you, regardless of your modeling preferences.

I have age-old questions, and I have no local authorities to ask:
1. What is involved with inverting single-cylinder glow engines? Is there truly a greater risk of flame-out, or "pooling," which causes hydraulic lock? Or is all of this hype and myth? How about if you use diesels? (I'm a fan of both fuel systems.) In general, do right-angle mounting attitudes offer better reliability?

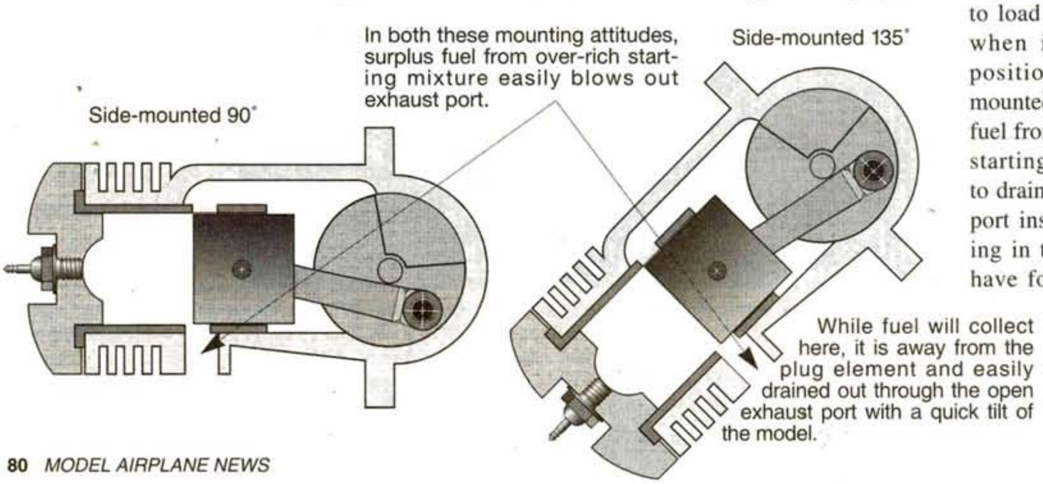
I simply do not have experience with many models and engine-mounting attitudes. I'm a relative beginner. Where scale is important, it would be nice to hide the engine completely by inverting it, but I'm concerned about the risk involved, if any.
2. To comment on your article about fuel content, Chris: Sig sees fit to publish full data in the Sig catalog. I appreciate Sig's candor. My next batch of fuel comes from Sig.

Some engines simply run better than others in the inverted position. This has much to do with combustion-chamber and carburetor design, which varies with manufacturer. The difference a combustion chamber can make was proven to me with Saito 4-stroke engines. I've always found that Saitos have exemplary idle and throttle recovery from idle response. After disassembling a late-model Saito, I shone a light into the one-piece cylinder/head assembly and noticed a highly turbulated (roughed up) combustion-chamber surface. I can only conclude this surface causes enough turbulence to keep the fuel/air mixture in an atomized state; in short, droplet formation is discouraged (droplets could douse the glow-plug coil when accelerating from idle or low throttle settings). Whether this particular manufacturing technique could also help with 2-strokes, I'm uncertain.

With respect to carburetor type, twin-needle carbs seem to handle inverted applications much better than air-bleed types do. Having a second needle dedicated to positive low-end mixture control gives twin-needle carbs excellent fuel metering at idle and partial throttle settings. Delivering precise mixture control at all throttle settings is very important when it comes to avoiding flame-outs—especially in inverted engines.



As for your question concerning "right-angle" installations, personally, I prefer the 90-degree (side-mounted) or the 135-degree (3/4 down) positions. I even prefer these positions to upright because the crankcase tends to load up more easily when in the upright position. In the side-mounted position, extra fuel from an overly rich starting mixture tends to drain out the exhaust port instead of collecting in the crankcase. I have found that idling in these two positions is every bit as reliable as in



the upright position. Moreover, the 90-degree and 135-degree mounting positions can often be cowled in with certain scale designs.

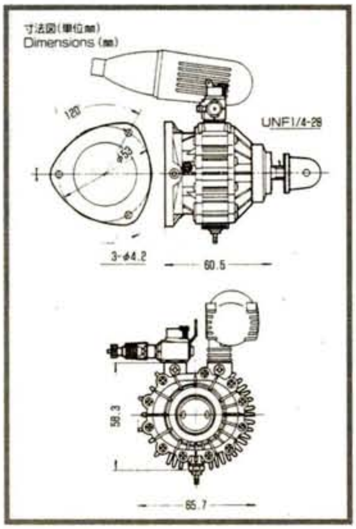
In the inverted position, the hemispherical combustion chamber does act as a "catch bowl" when running overly rich mixtures, and the glow plug is at the bottom of this bowl. Accordingly, flame-outs can be a problem with inverted engines, but if you approach the problem with a basic understanding of what happens and what needs to be done when an engine is upside-down, you can avoid flame-outs.

If you must mount inverted for scale purposes (as is the case when modeling a full-scale design that has an in-line, liquid-cooled engine), try to do the following:

• Select a familiar broken-in engine in which the carburetor is somewhat more sophisticated than an air-bleed type.
• Make sure the tank is in the correct position. Often, guys end up putting the tank too high, lining it up with the crankcase instead of with the spraybar, which is now lower than we are used to. Having the tank too high will lead to fuel siphoning—an impossible situation when you're trying to tune an engine.
• Of course, a fresh, hotly glowing plug is essential and, as an extra measure, adding an onboard glow lighter that automatically switches on at about 1/4 throttle would be the icing on the cake of insurance.
• Never go crazy with the electric starter because flooded combustion heads and hydro-lock situations can and will result, and proper "de-flooding" techniques will then have to become part of your starting and operating routines.
• Always store the model with the engine upright so oil doesn't pool in the combustion chamber and totally foul the plug.

I talked to my buddy Bob Davis at Davis Diesel, and he says that diesels do fine inverted. They can hydro-lock just as glow engines can, but they obviously have no glow-plug at risk of being doused by a wet fuel mixture.

And yes, Sig has always offered fuel made with high-quality ingredients and, on request, always tells the contents in terms of percentage by volume.



THE OLD WANKEL ON NEWER FUEL?

Here's an email from "Dave" about an oldie but goodie that intrigued this engine lover.

I have just obtained a Type 1-49 NSU Wankel engine—new in box but no instructions. My history with the Wankel engine is very good, as I worked with Fichtel-Sachs on the development of the Hercules Wankel motorcycle and also rode the Wankel-powered dirt bike at the Isle of Man in the 1975 International Six Day Trials. But I still am in need of your expertise with this engine.

Which fuel do they recommend? We had to use a very high oil-to-gas ratio with the Sachs Wankel to accomplish proper cooling and lubrication. Is it OK to tap into the muffler to pressurize the fuel tank?

Are there upgrades to exhaust-port timing to improve performance? I am guessing, but I believe the engine I have is about a 1973 vintage—no. B 211. I would like to get a manual and updates of any changes made to the O.S. Wankel of today.

Your article in the October '97 issue on oil content was very good and prompted me to look for this information from you.

I did get a large response to the "Content" article you refer to. Most encouraging.

Though, in later years, O.S. did improve the situation, the apex wipers on the early Wankel could be destroyed in one, overly lean, hot run. You're correct about needing a higher oil/combustible ratio with the Wankel. As further insurance, I added an extra 3 or 4 percent Klotz to my fuel as a "special blend" for my old Wankel. Mind you, this was in the days when a 20-percent-lubricant content was more the norm in model aircraft glow fuel. You might want to try adding 5 to 7 percent AA castor or Klotz to today's fuels.

To further reduce heat—the arch-enemy of any engine and particularly bad for the older Wankel—I ran mine without a muffler ("NO MUFFLER! CHRIS, ARE YOU A CRAZED FOOL!?!!"). Since the Wankel has a full 120 degrees of rotor movement between the point of combustion and the point of gas exit, leaving the muffler off does not lead to the loud "crack" of a conventional piston engine in which the points of combustion and gas exit can be measured in millimeters. In fact, I remember the engine being fairly quiet without the muffler. With the right prop, a non-muffled Wankel can pass the noise-level restrictions of some clubs. The Wankel's fuel draw never seemed to be a problem, so muffler pressure is not mandatory. If, however, you do need to use the muffler, installing a pressure tap won't cause any problems.

I recommend that you break in your Wankel with a 9x6 or 10x5 prop and without a muffler. Of course, cool, low-humidity days are best. For normal flying on a fairly low-drag sport or pattern monoplane, a 10x6 or 10x7 APC should do the trick nicely. Spinning a Zinger or RevUp 10x7, my old Wankel (.30ci) would turn up as well as my SuperTigre .46—a very powerful R/C engine back in the days of loop scavenge porting.

The old Wankel was almost as heavy and as thirsty as a .60, but it was a strong engine that gave me good service as long as I took appropriate precautions. Incidentally, the new Wankels are lighter and not as sensitive to lean runs.

Good luck, and let me know how you make out.

Golden AGE OF R/C

by HAL deBOLT

CHESTER LANZO

Chester with his "Lanzo Bomber" in the free-flight days.

YOUR OT R/C PLACE is of utmost importance, and there is a backlog of your letters that needs attention. The historical review of the first R/C'ers is well along, however, so I will complete what I've started and then devote some time to your mail, OK?

As you'll recall, we have discussed that the pioneers of R/C—Clinton DeSoto, Bill and Walt Good and Chester Lanzo—developed it from '34 to '37. We have covered DeSoto and the Good brothers. If anyone can add to our history, please tell us! The Lanzo saga will complete that part of R/C history.

I was fortunate to have spent time with Chester Lanzo during his last years. Chet passed away several years ago at age 75. A native of the Cleveland area, Chester and his wife, Peggy, also maintained a winter home here in Sun City Center, FL. Unfortunately, Chet was severely handicapped by a painful back during his last years, so he wasn't able to continue modeling. He did say, however, that one of his joys in those days was the weekly trip to the flying field with me. Other delights included hearing from his many modeling friends and discussing model aviation.

Lanzo was one of the first to explore scale R/C; here he is with his nice SE-5.

Chet was an aeronautical engineer who first worked with a Cleveland aircraft systems company. In that era, new energy sources—and how to conserve them—were in the headlines. Chet and Peggy decided to build a new home and, as with his models, it had to be the finest he could imagine. With his foresight, solar power, superior insulation and other ideas for energy efficiencies went into the home. His efforts were extensive and were considered newsworthy by the Cleveland press. His accomplishments struck the fancy of other homebuyers and, before long, he was building these homes for a living. This proved most lucrative, and by the time he joined NACA's Lewis Research Center, he had made a bundle. Ever aviation-inclined, he stayed with the Lewis Research Center until he retired.

A cute incident at the Lewis Center requires our attention. Dick Obarski, an early flying buddy of Carl Goldberg's and an ongoing indoor fanatic, is also a resident of Sun City Center. Dick became acquainted with Chet Lanzo during his Ohio days. You pre-R/C people will surely remember Heli-Arc wheels, which were an Obarski invention. A major feature of the wheels was low drag. The Lewis Center had a vertical wind tunnel, so Chet and Dick tested the wheel drag in the Lewis tunnel!

As with many OT'ers, Chet's aviation dreams commenced in the Lindbergh era with rubber power and free flight. Lanzo's passion proved lifelong. *American Boy* magazine occasionally published plans for model airplanes in those early days, and Chet said that his first model was built from one of those plans.

A modeling buddy of Dick Korda's, Chet explained that their friendly rivalry led them to the upper echelons of rubber-power endurance. When gas engines arrived, Chet added them to his entourage and again

showed his free-flight prowess. The best example of that might be the preponderance of Lanzo designs in SAM's old-timer events.

At the beginning of this history, I suggested that the desire for R/C was to keep from losing precious gas models—an idea exemplified today by SAM's R/C-assisted free flights. Chet once told me that this idea had crossed his mind, but the *major* reason to attempt R/C was to prove that a flying model could be remotely controlled. His effort toward that end was impressive.

Chester was proud of his Stinson and kept it until he died.

Unlike the Good brothers and Clinton DeSoto, Chet wasn't knowledgeable in electronics, so when he attempted R/C, it was as a layman. Chet found that a license was required to operate a radio transmitter, and he was surprised to find that the American Radio Relay League (ARRL) offered night classes in Cleveland. Completing the class could lead to a ham operator's license, so Chet added that course to his library studies. Just imagine the effort expended to accomplish a modeling goal! With his studies completed, Lanzo was ready to attempt R/C. (For those interested, the ARRL publishes one of the finest basic electronic radio manuals—an experimenter's bible.)

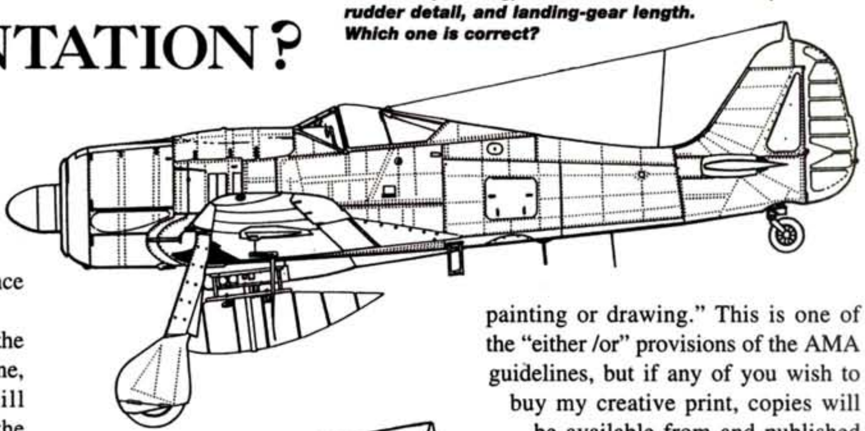
It should be apparent that Chester Lanzo did so many great things, his modeling history would fill a book. I have covered his life as it brought him to R/C. His R/C efforts are also extensive; we will get to them next time.

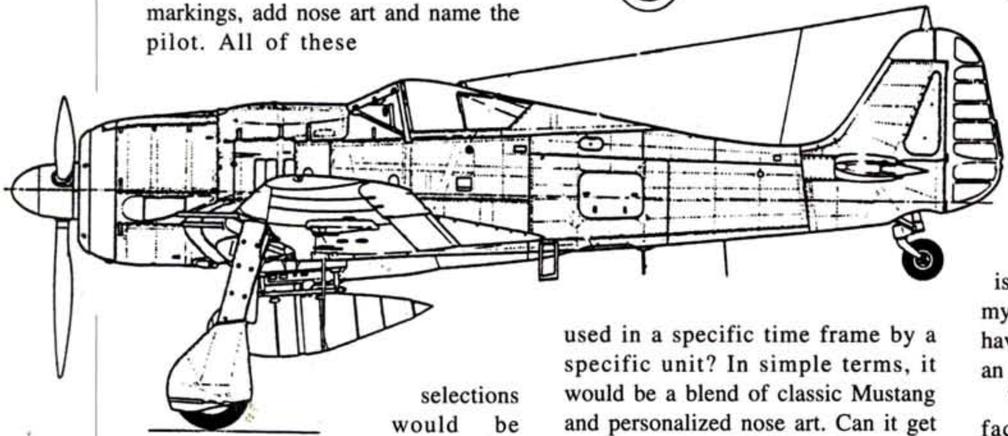
Until then, have fun, enjoy OT R/C and remember: this is your OT R/C place! ✦

Scale TECHNIQUES

by GEORGE LEU

DOCUMENTATION?





Here are two side views of a Focke Wulf FW 190A-8 from two different reputable sources. Note the differences in paneling, hatch locations and sizes, rudder detail, and landing-gear length. Which one is correct?

I WAS READING a recent issue of *Flight Journal* and encountered a unique advertisement from the "Mustang Club" for a personalized P-51 painting for $49.95, plus S&H. Since I like P-51s, it piqued my curiosity.

This offer allowed me to select the plane's paint scheme, name the plane, pick the number and style of kill markings, add nose art and name the pilot. All of these selections would be done using the form and characters from WW II, thereby providing an "accurate" representation, regardless of the plane's actual existence.

If you choose the blue 352nd Fighter Group colors on your plane, add the type of kill marking, put your wife or girlfriend's name on the nose and your name on the canopy, you will have a colored print of the plane you *might* have flown had you lived during WW II. Wow!

I just ordered my print, and I selected a red/yellow/olive scheme from the 357th Fighter Group. I selected five kill markings (making me an "Ace," which is my nickname) consisting of a swastika on a red flag, and I named my plane "Nina," after my wife. When this print arrives, it will be a great conversation piece, but will it also be documentation for a competition model?

What would happen if my competition Mustang reflected a scheme I liked, created by me and yet very accurate to the original WW II motif used in a specific time frame by a specific unit? In simple terms, it would be a blend of classic Mustang and personalized nose art. Can it get any better than this? Would it work in competition?

Is it legal because it meets the AMA requirements for scale documentation? The AMA regulations state, "If no photo is available, written or drawn material showing markings and/or color scheme may be substituted." These regulations also state, "It is not the intent of the documentation rules to limit choice of scale subjects only to those aircraft for which a large amount of data is easily available or penalize the use of rare color or markings schemes. In many cases it is not possible for the builder to provide enough photos of the same plane to cover all aspects of color and markings. In these cases, no downgrading will be done for lack of proof of the other side, or bottom, etc., or for the use of written proof of color in lieu of color photos or drawings."

Under the AMA Sport Scale Regulations, my print would be acceptable because it is "Some other pictorial representation, such as a magazine or other published color painting or drawing." This is one of the "either /or" provisions of the AMA guidelines, but if any of you wish to buy my creative print, copies will be available from and published by the Mustang Club.

For the true purists of R/C scale, my entire proposal would certainly be unacceptable. Think of the many errors we witness in paintings and drawings from our so-called "reliable" published sources. What is the difference between those and my Mustang Club painting? All I am having them do is modify nose art on an established WW II color scheme.

Years ago, the plastic model manufacturers decided not to show the swastika symbol on the tail of the Luftwaffe aircraft portrayed on their box art. Since they modified their published box-cover paintings, people have continued to use them for scale documentation. If you wish to add a swastika, you may, because it would be correct. If you decided not to use it as a marking on your plane, and your box art didn't show it, you would also be correct. Is this fair? What is wrong with using a slightly modified custom print?

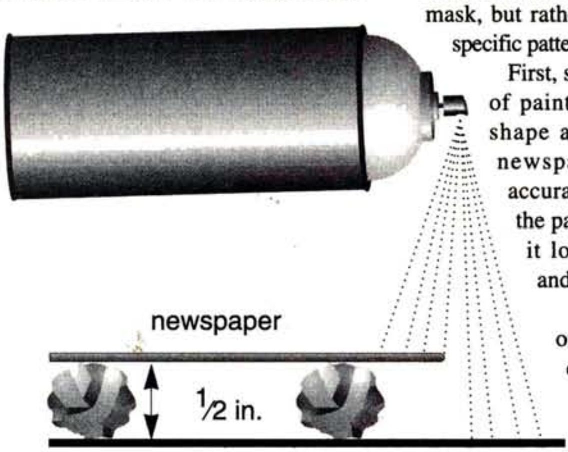
How many of you have purchased a kit that included a 3-view drawn by the manufacturer of the kit? I know I have. I have used them for my outline documentation on numerous occasions. They are published drawings and, because of that, they are acceptable for your documentation package. Are they accurate?

Without naming manufacturers, some of these published drawings have the gear location accurate to the model but slightly wrong when compared to the prototype aircraft. I have seen this with wheel-cover size,

height from the ground, fin shape, dihedral angles, etc. Is it wrong? Yes. Is it terrible? No!

If you look at Wylam drawings, Koku Fan drawings, etc., you will find many disparities. Selecting my outline drawings for my Top Gun A6M3 Zero was difficult because I have three sets of 3-views, and each conflicts with the others. I finally went with the drawings that most closely resembled the photos I have. Problems like this are common to all R/C scale competitors. I don't think we see a conspiracy to commit fraud by kit manufacturers and artists making drawings, but we do recognize the challenge to come up with a true scale aircraft.

In actuality, I plan to use my "developed" scheme for my Byron P-51, which will be flown at IMAA warbird events. The bigger issue involves the new information age and how a computer may be used to enhance paintings, drawings—or maybe history. If we can all make a gentlemen's pledge to keep the spirit, motif, colors, markings, etc., within the guidelines of historical correctness, scale modeling will grow.



To spray very soft-line camouflage, use crumpled tape under newspaper masks and spray at 90 degrees to the surface.

If we do not agree to this pact, then sooner or later a scale judge is going to be challenged by a drawing that is accurate to the model, yet totally inaccurate to the full-size aircraft (I know from my experience as Chief Judge that contestants have been caught using modified 3-views for their documentation source, and they've been disciplined for it). Now, the large-scale events require you to reference, or bring with you, the book in which your 3-view drawing was found.

The main issue with which I, and all of you, should be concerned is not the existence of incorrect or modified 3-views, Mustang Club paintings or modified box art. The real issue is: how do we discriminate between them, and where do we draw the line between what is acceptable and unacceptable?

When the AMA Sporting Code was established, easily manipulated computer graphics were not as available as they are today. Should we take a second look?

PAINTING SOFT EDGES

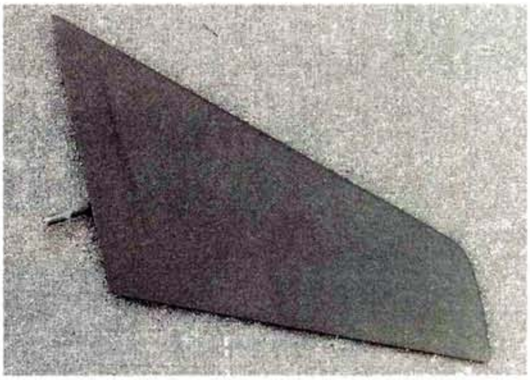
As I put the finishing touches on my Usher Enterprises F-100, I found a new method for masking camouflage patterns. It requires no tape for the actual mask, but rather, newspaper cut into specific patterns and taped into place.

First, spray on your base coat of paint. Check the full-size shape and carefully cut the newspaper to a relatively accurate design. Place it on the part to be sprayed, and if it looks okay, take it off and dip it in water.

Lay the wet template on your part and blot it down with a soft, absorbent paper towel. Because it is wet, it virtually sticks to the surface. Make sure the template is secure and will not move by taping the paper to the underside. Dry your painted surface, and you are ready to spray.

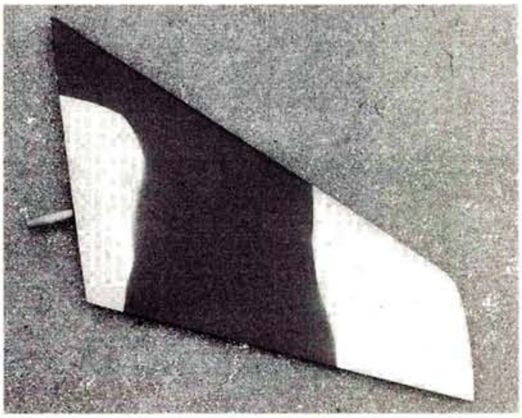
The result is a soft line that is not as fine or exact as if you had used tape. On my F-100, the effect is very nice and looks very much like the real thing. But the F-100 had other camouflaged areas that had even softer lines separating the various colors. To achieve this style, a little modification to this technique had to be developed.

Follow the above procedure, but do not wet the paper. When you are happy with the template pattern, turn it over and place some rolled-up masking tape about one inch from your paint edge, every two inches along its contours. Keep the height of the rolled-up tape at approximately half an inch. Flip it back over the desired location and press down on the tape. Your pattern should be off your surface by the height of the tape.



Paint the part using the base coat color.

Mask off using wet newspaper, dry the part and paint.



This method results in slightly soft edges on the camouflage.

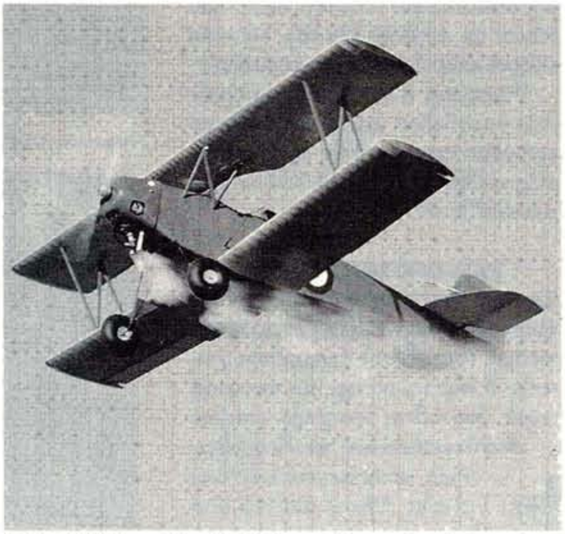
When you spray the color, make sure you are shooting away from the edge, or perpendicular to the surface. This will prevent any paint from going underneath your template. This effort will produce a pattern with very soft lines, similar to those on a WW II Messerschmidt Me-109G. ✈

Thinking BIG

by GERRY YARRISH

UNDERSTANDING GASOLINE ENGINES

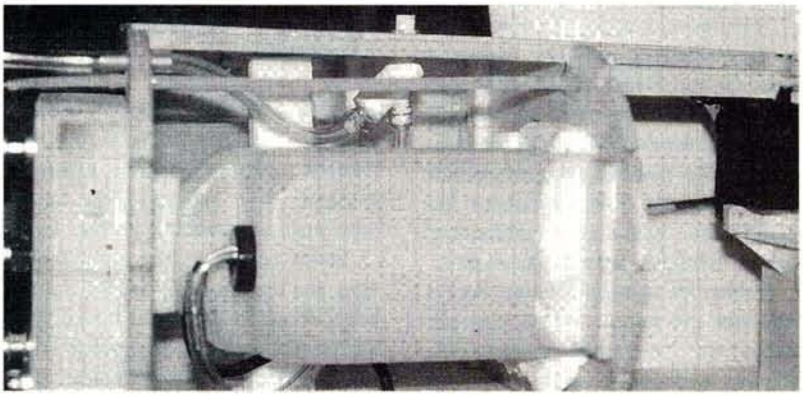
THE ONE ELEMENT that sets most big birds apart from the rest of the models at the flying field is their powerplants—gasoline engines. Even though big-displacement, 2- and 4-stroke glow engines are also used to power big models, it is the gas engine that generates the most worried looks from newcomers.



A big old biplane flying behind a gasoline engine. It doesn't get better than this; that is, if your engine is running correctly.

For some reason, many modelers believe that when you take an ordinary gasoline engine out of a simple to use chainsaw and hang it on a firewall, its operation somehow becomes more difficult. Why? I fell under this same misconception when I first got into the big bird mindset. I can tell you there's nothing magical about gasoline engines. They are different in setup and operation compared to our trusty old glow engines, but they are not more difficult to run. In fact, I'd say that if properly taken care of and adjusted correctly, gasoline engines are easier to operate and are more reliable.

Today, we have a huge selection of gasoline engines to choose from. They come with proper ball-bearing support for the crankshaft, and many have well-balanced flywheels and produce a minimum of vibration. Regardless of make or model, all gas engines need the same three things to operate. Remember that theoretical triangle we learned about in school that represented the requirements for a fire: fuel, air and heat? Well, these are exactly the same things needed for any internal-combustion engine to operate. Remembering this will help you operate and troubleshoot any engine—glow or gas.



A gas engine is only as good as its fuel supply, so be sure to install the fuel tank and fuel lines properly during model construction. I insert brass tubes through the firewall and attach the fuel lines to it to minimize the chance of pinholes developing. Also, note that I use safety clamps at all line-attachment points.

• **Fuel.** First, the engine needs a steady supply of clean, filtered gas. This means the fuel line, the fuel inlet on the carb and the fuel tank all have to be free of blockage. The standard Walbro carb found on most gasoline engines has a built-in diaphragm pump that draws the fuel into the carb. Under normal circumstances, the carb needs minimal maintenance. A good quality 2-stroke oil must be mixed into the gasoline for proper lubrication and cooling of internal engine parts. For new engines, use a 30:1 gas/oil mix, and after you've run a gallon or so through the engine, switch to a 40:1 mixture. Standard 87-octane gas from the local gas station is all I burn.

• **Air.** The second requirement is for the carburetor to be properly adjusted for the air and fuel to mix correctly. The mix should not be too rich or too lean for proper operation. The carb has two needle-valve adjustment screws that control the high-end and the idle (low-end) fuel mixtures. The idle mixture should be adjusted first for a reliable idle and smooth transition to full power. After this has been done, the high end should be adjusted. But more on this later.

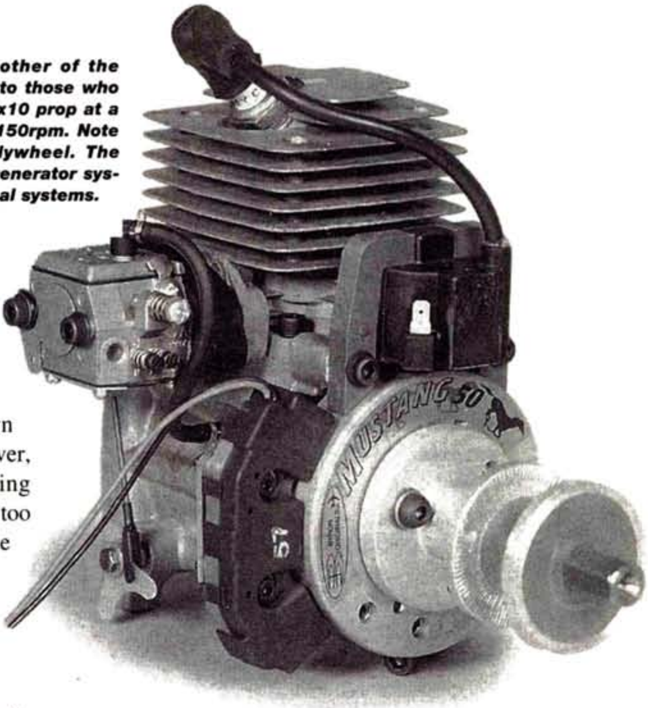
• **Heat.** The last part of the equation is the ignition system. Whether magneto or electronically driven, the ignition system must operate properly to produce the power to fire the spark plug. If you have a magneto on your engine (most stock engines do), check the instructions for the proper magneto/flywheel gap setting; between 0.010 and 0.015 inch is the norm, but check the manual to be sure. For an electronic-ignition setup, be sure the power battery is fully charged and the gap between the magnetic pickup sensor and the flywheel is also set properly. Older electronic-ignition systems with mechanical spark-advance setups also must be set up per spec. For safety reasons, it is also a

good idea to install an ignition kill switch on your engine. This is also a requirement at all IMAA-sanctioned events. Finally, check the spark-plug gap and set it between 0.020 and 0.035 inch. Reinstall the plug and we're set to go. But how do you know if your engine is set up correctly?

STARTING PROCEDURE

Before starting your engine, always check the instruction manual that came with it. If, however, you don't have one, try this procedure; it usually works for me.

Switch the ignition circuit (kill switch) off and choke the engine for 3 to 5 turns of the prop. If your engine does not have a choke butterfly, then stick your thumb into the carb to choke it. Check that fuel is entering the carb (is your thumb wet?). Now, open the choke (pull your thumb out of the carb) and open the throttle full open. Now, while a helper holds your model, quickly flip the prop through several times until you hear an ignition cough. Next, bring the throttle to about 1/4 and flip the prop again; it should start on the third or fourth blade. Let the engine warm up for a couple of minutes before advancing the throttle.



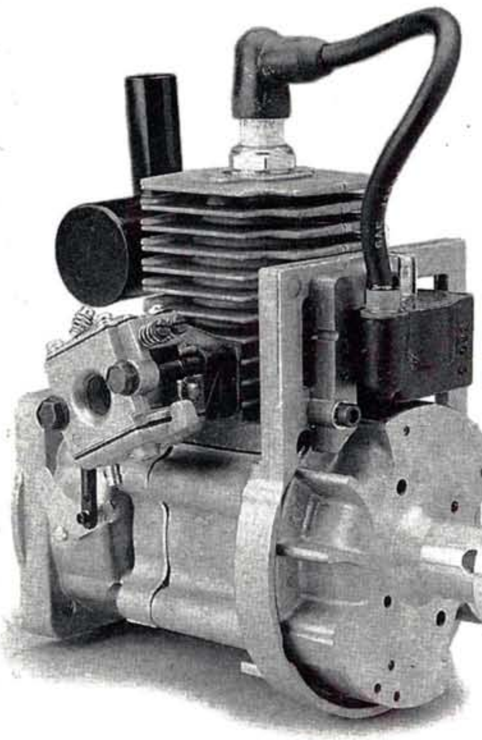
Byron Originals' Mustang 50 is another of the relatively new powerplants available to those who think big. The Mustang 50 turns a 20x10 prop at a nice 6,850 revs and idles down to 2,150rpm. Note the attachment to the left of the flywheel. The engine is available with an onboard generator system to power lights and other electrical systems.

NEEDLE SETTINGS

Once the engine has warmed up, advance the throttle slowly to full throttle, and note the response. If the engine sags, loads up and dies, then it's too rich. Lean the low-end needle 1/8 turn clockwise, and try again. If, however, the engine makes a hollow burbling sound and dies, then the mixture is too lean, and the needle needs to be opened up 1/8 turn counterclockwise. What you are looking for is a smooth, slightly delayed transition to full throttle.

Next, adjust the high-end needle until rpm peaks out and then back off the needle, decreasing rpm by 200 to 300. All engines unload during flight, so don't try to get every single rev from your engine on the ground. Finally, once you have the high-end needle set, go back and check the low-end setting, since adjusting either needle has a little cross-over effect that may change your previous settings.

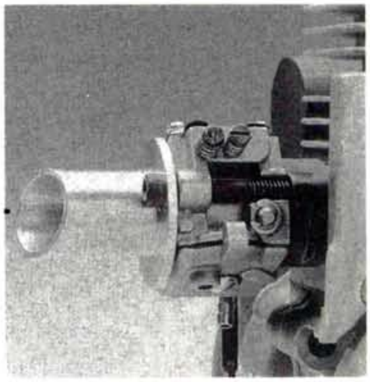
One of the nice things about gas engines is that once set, the carb may not need to be readjusted for an entire flying season. If, however, you do have trouble getting the needles set, close them completely and open them 1 1/2 turns each to start with. This setting won't be perfect, but it will get the engine started.



The U.S. Engines 25. A new kid on the block, this engine is very reliable and can turn an 18x10 prop at 6,400rpm. Impressive.

WHAT ELSE COULD BE WRONG?

By now, I hear some of you saying, "But Gerry, I've done all that, and I still can't get this beast to run! What else can I do?" Well, for one thing, you can check the position of your prop relative to the magnets on the flywheel. If you're having a very hard time hand-starting your engine, try changing the prop's position. I personally like to start my engines with my left hand, swinging the prop from the 11 o'clock to the 7 o'clock position. At about the 9:30 position, the magneto should produce the spark to fire off the mixture. If everything has been set properly, you should never get red-faced trying to start your engine. Here are some more troubleshooting tips.



Here's a nice little addition to your U.S. Engines 25cc engine—a velocity stack. I like to use stacks on my engines, if for no other reason than that they help eliminate fuel blow-by; that is to say, it prevents propwash from siphoning fuel out of the carb.

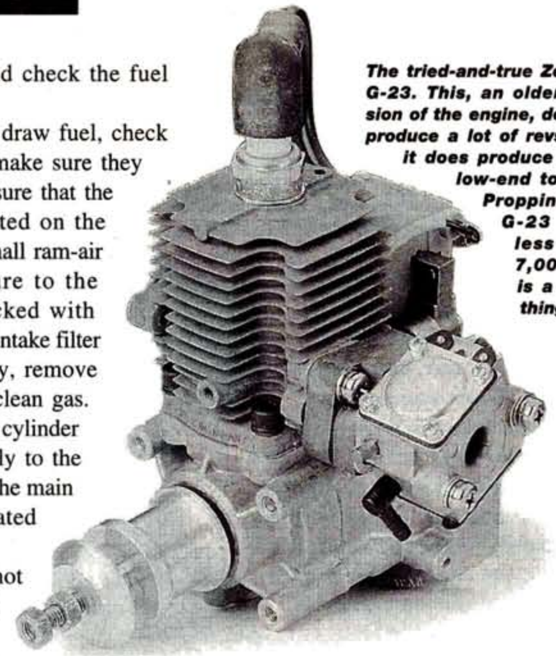
- If the engine starts, burns off the prime, then dies, this indicates a fuel-draw problem. Check the fuel lines for

kinks or pinholes, and check the fuel tank for proper setup.

• If the engine won't draw fuel, check the needle valves to make sure they are open. Also make sure that the carb is tightly mounted on the engine and that the small ram-air hole feeding pressure to the diaphragm isn't blocked with debris. Check the fuel-intake filter screen and if it's dirty, remove and flush it out with clean gas. Finally, check that the cylinder head is mounted tightly to the crankcase. Make sure the main cylinder gasket is seated properly.

• If the engine does not produce a spark, check the kill switch (it should be in the open position). Check the spark-plug wire and the ground wire to the switch for proper condition. For electronic ignitions, be sure you have a fully charged power battery and that all the wiring is secure, including the sensor lead.

• If there is no compression, then check for a stuck or broken piston ring and see if there are any scores or gouges in the sleeve.



The tried-and-true Zenoah G-23. This, an older version of the engine, doesn't produce a lot of revs, but it does produce good low-end torque. Propping the G-23 for less than 7,000rpm is a good thing.

READ THE PLUG

So now your engine is running and you have even put a couple of flights on your engine. How can you make sure all is as good as you hoped for? You can check the spark-plug color. After a run, remove the plug and look at the ceramic cone surrounding the element. If it is a white, powdery color, then your mixture is too lean. If it's black and the element is wet, then the mixture is too rich. A properly adjusted carb will produce a light brown or beige color—sorta like the color of a brown paper shopping bag.

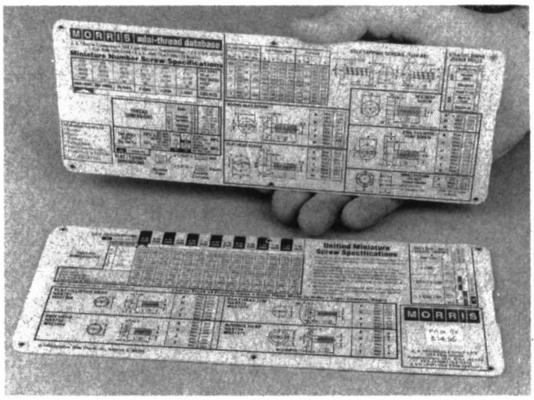
So, there you have it. Running gasoline engines is no more difficult than running glow engines; they're just different in setup and operation. A final bit of advice is not to chase high rpm. Use a prop that gives you top ground rpm slightly above the best torque rpm (check with your engine manufacturer). Gas engines are happiest while running slightly rich and in a slightly loaded condition. See ya.

Product NEWS

LATEST PRODUCT RELEASES

MORRIS

Mini-Thread Database



This durable plastic slide chart provides number, screw and UNM specs for a variety of screw and fastener types and the hole sizes to drill before tapping for various thread percentages. The database includes decimals for metric, number and fractional drills and flat and corner measurements for hexagonal and square shapes.

Morris also offers a free brochure listing their products. **Price**—$14.99.

J. I. Morris Co., P.O. Box 70, Southbridge, MA 01550-0070; (800) 621-3937, fax (508) 764-7350.

FRANK TIANO ENTERPRISES

Zap Gel

Now available in a larger, 0.7-ounce tube, Zap Gel is perfect for high-stress areas and load-bearing parts, such as landing-gear blocks, hardwood motor mounts, plywood plates and servo mounts. Gel CA is so concentrated that it won't run, even on a vertical surface. **Part no.**—PT-26 (0.7-ounce tube); price—$4.99.

Frank Tiano Enterprises, 15300 Estancia Ln., West Palm Beach, FL 33414; (561) 795-6600.

ALBATROS PRODUCTIONS LTD.

Windsock Mini-Datafiles

Ray Rimmel's company, Albatros Productions Ltd. has established itself as the world authority in WW I aircraft, principally because of its series of Windsock Datafiles. They add to their offerings several new mini-Datafiles, including volumes on the Sopwith Tabloid and Fokker D.V. These mini-Datafiles, while not quite as elaborate as full-blown Datafiles, cover some of the more obscure subjects of WW I through the use of 3-views, photos and words. The Tabloid is of particular interest as it is the aircraft that transitioned the Sopwith from wing warping to aileron axial control. **Prices**—$13 (Fokker D.V.); $15.50 (Sopwith Tabloid).

Albatros Productions Ltd.; distributed by Wise Owl Publications, 4314 West 238th St., Torrance, CA 90505-4509; (310) 375-6258; email : wiseowl@sprintmail.com.

PLANETALK

Color Airborne Video System

The 1.5x2.25x4.25-inch, 10-ounce unit comes ready to use and includes batteries. The receiver comes standard with a high-resolution patch antenna, two video outputs and one audio output. A video/audio cable is included so that you can plug the system into a camcorder or TV monitor to view or record. The price of the video demonstration tapes and catalog will be credited with purchase of the system. **Prices**—$29.95 (two-part video demo tape and catalog); $1,795 (total package).

PlaneTalk, 16201 Osborne St., Westminster, CA 92683; (714) 650-5004, fax (714) 847-0540.

JOHN FREDRIKSEN

Model Warplanes

This five-volume set is now available at a 50-percent discount and lists over 10,000 plans, kits, photos and 3-views from around the world. **Price**—$25 (plus $3 S&H).

John Fredriksen, 461 Loring Ave., Salem, MA 01970; website: http://www.rconline.com /1812.

Product **NEWS**

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Laser 200

This ¼-scale kit features balsa-sheeted foam-core wings and fiberglass wheel pants, canopy and detailed one-piece cowl, and it comes with a complete hardware package that includes heavy-duty landing gear. Specifications: wingspan—72 inches; wing area—810 square inches; weight—7.5 to 9 pounds; engine required—.90 to 1.08 2-stroke or 1.20 4-stroke; radio required—4-channel.

Part no.—QDTA5000; price—$379.99.

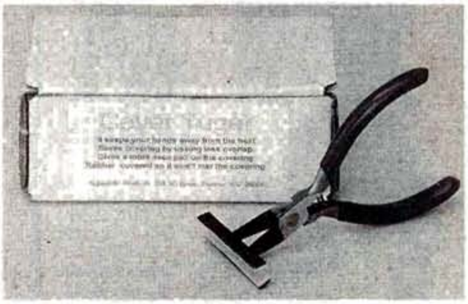
Quadrotech; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300, fax (217) 398-0008.

SUPERSTAR PRODUCTS

Cover Tuger

This useful tool helps you cover your airplane by grabbing covering material to keep it taut and prevent your hands from touching the hot iron. The Cover Tuger's wide jaws are lined with rubber to avoid marring the covering material and to provide additional gripping power. For more information, see your hobby dealer or write to Superstar Products.

Superstar Products, 204 Fifth St., Chester, WV 26034.



EDJER

Hobby Blade Sharpening Kit

Featuring an interchangeable Arkansas whetstone, a ceramic sharpening block and a high-quality diamond sharpening stone, this new kit from Edjer allows you to apply a new edge to those old, dull hobby blades in a jiffy. A swivel sharpening block positions the hobby knife precisely while sharpening the blade. Non-toxic, bio-degradable Edjer lube is also included in the kit.

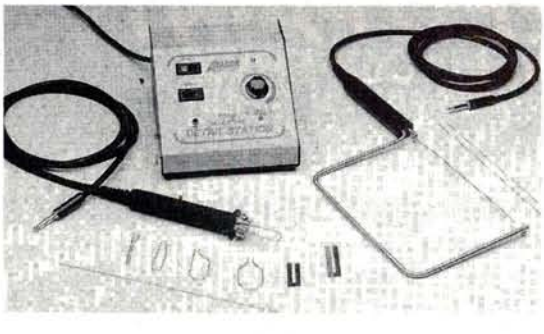
Part no.—EDJ; price—$22.

Edjer, 1971 Tamarack Ln., Hemet, CA 92545; (909) 925-2344.

AVALON CONCEPTS CORP.

Foam Sculpting Detail Station & Hot Knife

This table-top tool cuts and shapes expanded and extruded polystyrene and polyethylene as well as other material. It includes thermostat control to make easy temperature adjustments and comes with a small wire blade and a detail wand with a padded, no-slip handle that allows you to make intricate shapes. The hot knife actually melts through foam and features a 16-position adjustable temperature control and triggered on/off switch that allow the blade to heat up in seconds to 750 degrees F.



Prices—$129.95 (detail station); $198 (hot knife).

Avalon Concepts Corp., 1055 Leisz's Bridge Rd., Leesport, PA 19533; (800) 636-8864; fax (610) 916-1131, website: www.avalonconcepts.com.

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BUSINESS

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SODA-CAN AIRPLANES—replica biplane detail plans with photos, $7.50 PPD. Early's Craft, 15069 Valley Blvd. SP 26, Fontana, CA 92335. [8/98]

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BUILD A BIKECAR: http://www.bikecar.com. [6/98]

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BUSINESS FOR SALE: established hobby shop, Western Colorado. Mild climate. Contact Charles, (970) 245-5504. [5/98]

PRECISION PLUNGE ROUTER BASE FOR DREMEL MULTI-PRO TOOL, January *MAN*, p. 14. Unprecedented accuracy, smoothness of cut. Now available. Bishop Cochran, 4326 S.E. Woodstock, #498, Portland, OR 97206; email: bishopcochran@ibm.net. [7/98]

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NEW ZEALAND AERO PRODUCTS. Scale plans: Cessna Agwagon, Transavia Airtruk/Skyfarmer, Piper Pawnee, Piper Pawnee Brave, Fletcher FU-24, Douglas DC-3/C-47, Cessna 152 Aerobat, Hall's Springfield Bulldog, Rearwin Sportster, Fairchild PT-19, Fleet PT-26 & more. Hardware paks, colour photo paks, free documentation. Catalog/price list: $5 (U.S.); Visa/MC. 34 Ward Parade, Stirling Point, Bluff, New Zealand. Phone/24-hr. fax, 643-2128192. [4/99]

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MAGAZINE BACK ISSUES—*American Modeler, American Aircraft Modeler, Aeromodeller, Model Airplane News, Model Aircraft, RCM* and more; 1930s–1990s. For list, send SASE to Carolyn Gierke, 1276 Ransom Rd., Lancaster, NY 14086. [5/98]

MODEL AIRPLANE NEWS, 1930-1980; "Air Trails," 1935-1952, "Young Men," 1952-1956; "American Modeler," 1957-1967; "American Aircraft Modeler," 1968-1975. $1 for list. George Reith, 3597 Arbutus Dr. N., Cobble Hill, B.C., Canada VOR 1L1. [5/98]

WANTED: old, unbuilt, plastic model kits from '50s and '60s. Send list, price to Models, Box 863, Wyandette, MI 48192. [3/99]

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NEED: company that repairs older "Reed" radios. Need working "Reed" servos; Graupner "Cirrus" kit. Reasonable. (213) 661-5500; fax (213) 661-5430. [5/98]

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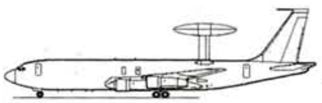
FINAL CLEARANCE—remaining aircraft items. Send SASE for list. G. Hunicke, 18 Media Dr., St. Louis, MO 63146. [5/98]

IN SEARCH OF: decal that was made for the Revell Plastic model kit, Fairchild F-27 in the Piedmont Airlines markings. Respond to: Jay Blackwood, 1564 Bleumont Ave., Apt 179, Roanoke, VA 24015, or call (540) 982-3639. [6/98]

EVENTS

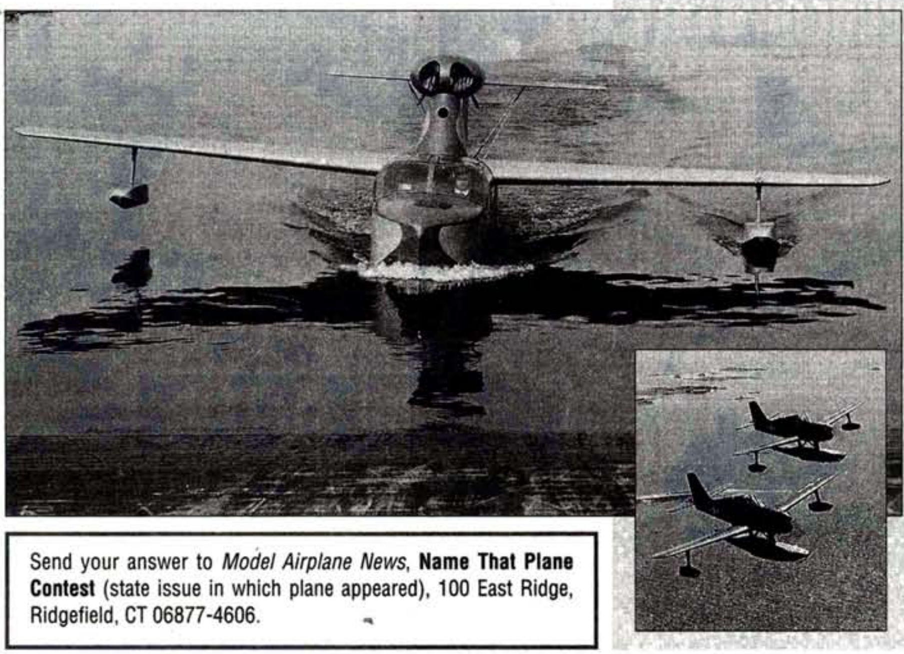
T.O.C. OF MARYLAND FLY-IN AND COMPETITION, May 29, 30 and 31, weekend extravaganza. Packed full of flying and fun. Mixed open, demo and competition flying—Saturday/Sunday afternoon. $$ prizes. For more info, call Art Vail, (410) 247-4281. [6/98]

April 19: Elk Grove Village, IL. Chicagoland Radio Control Modeler's 17th Annual Auction and Swap Meet. Al Hattendorf Center, 225 E. Elk Grove Blvd., Elk Grove Village, IL. 10 a.m.—2 p.m. General admission $3; vendors $12 (first table) includes 1 admission. Additional tables, $10. Setup 8:30 a.m.—10 a.m.; doors open to public 10 a.m. Auction @ noon. Advance reservations accepted. Dave Crown, 9386 Landings Square, #507, Des Plaines, IL 60016-5270; (847) 824-6392. [5/98]



Name THAT PLANE

CAN YOU IDENTIFY THIS AIRCRAFT?



Congratulations to Jess Larsen of St. Paul, MN, for correctly identifying the February 1998 mystery plane as the EDO X0SE-1. Designed and built by EDO Corp. from the floats up, the plane was powered with a 550hp, 12-cylinder, inverted, air-cooled Ranger engine and had a range of more than 1,000 miles with top speeds in excess of 200mph. The XOSE-1 featured self-sealing gas tanks and full armor protection for the pilot, and it was equipped to carry depth bombs, guns, personnel rescue cells, radar and other electronic equipment. Its folding wings allowed the plane to be stored in restricted areas, such as onboard an aircraft carrier.

Send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606.

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free one-year extension of his subscription.

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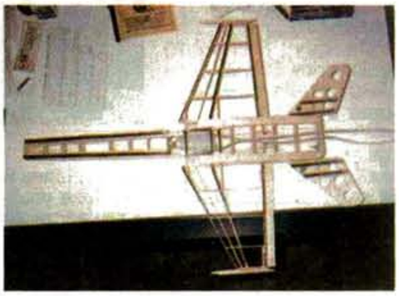
AFFORDABLE FIGHTER



A bottom view of the airframe structure showing the carbon fiber in place.

THERE IS NO LIMIT to what a vivid imagination and good modeling skills can accomplish. An example of that is Michael Cirigliano's F-18 Hornet. Mike is an interesting character in that he's very interested in jets and also very interested in small models. Most of us think of "jets" as being large, complex models, generally with very healthy price tags. That need not be the case. Mike's F-18 is built from a kit costing less than $30 and it's powered by a $40 engine. In spite of that, this model is awesome, way beyond its size. The word that comes to my mind is … cool! Way cool.

Mike started with a Today's Hobbies F-18 Hornet kit. These 1/24-scale kits by Bob Klauss are sold largely as display models, though the manufacturer does suggest that they could be made flyable. They are constructed in traditional stick-and-tissue style but with no provision for active control surfaces. To produce a flyable R/C model, Mike substituted a Clark-Y airfoil to improve lift characteristics, and he added some carbon-fiber here and there to strengthen the structure without adding much weight. Covering and finishing are done with Sig tissue, which was painted with dope. The main gear wheels are modified Dave Brown Lite Flight wheels for the undercarriage. The nose-gear wheels are Perfect wheels.

The plane is powered by a Norvel .061R/C engine that sips fuel from a 2-ounce fuel tank. The radio system is a Canon ultra micro system controlling stabilators, throttle, steerable nose-gear and ailerons. The amazing thing is that the all-up weight of this masterpiece is only 17 ounces.

The paint scheme was modeled after Lt. Cmdr. Scott Moyer's Blue Angels mount. As is the gracious nature of the Blue Angels pilots and crew, they posed with Mike and his craft. One of the pilots wanted to buy the model, but Mike stood his ground, looked at the pilot's Hornet, looked at his model and asked, "Why don't we just trade?"

—Larry Marshall

Mike poses with the Blue Angels and his plane.